Students' perceptions of and performance in online learning : an examination of the community inquiry model

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An Examination of the Community of Inquiry Model

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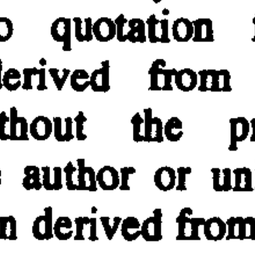

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Abstract

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The Community of Inquiry model (Garrison, Anderson & Archer 2000) argues that learning through online conferencing occurs within an online community through the interaction of cognitive, social, and teaching presences. The model is considered "noteworthy" in the recent development of theory in distance education (Gibson 2003: 156) but empirical studies investigating the influence of the three presences are rare. The main purpose of the study is to examine and evaluate the explanatory power of the Community of Inquiry model and explore the interrelationship of the various presences. The objects of the study were students in the Open University of Hong Kong (OUHK) and students' perception in the use of online conferencing in the OUHK was also investigated.

Data were collected from an online survey. Questionnaire items were constructed based on modification of the content analysis frameworks by Garrison and Anderson (2003), and the reliability and validity of the scales were verified in a pilot study. Students from 34 courses in the OUHK were invited to participate in the main survey and there were 162 valid respondents.

Correlations and ANOVA indicate that the three presences of the model are positively correlated to students' satisfaction and perceived attainment, but not to students' participation in the online conference. The postulation suggested by Garrison et al. (2000) that teaching presence and social presence both support cognitive presence is also supported by a series of multiple regression analyses. The use and students' perception of online conferencing in the OUHK were also reviewed. The general participation rate of the conference was low and students were expecting more active participation from their tutors and fellows. Recommendations for better utilizing the online conference in the OUHK are then proposed.

The result of this empirical study of the Community of Inquiry model in Hong Kong confirmed the explanatory power of the model and the interrelation of the three presences. The new instrument developed in this study can also facilitate more sophisticated studies in the future.

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Declaration

This thesis results from the author's own work and none of the materials presented in this thesis have been submitted previously for a degree in this or any other university.

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Chapter 1 - Introduction to the study

1.1 Introduction and Background

Owing to the very nature of distance education, students and their teachers in distance learning programmes are normally geographically separated, and direct interaction between them is restricted. To remedy the shortfall, various media of teaching and learning have been employed in distance learning courses. From the earliest correspondence learning packages to the recent online learning via computer-networks, distance-learning educationists have endeavoured to enhance interactions between students and their teachers.

Text-based computer-mediated communication (CMC), such as email and online conferencing, is widely accepted as an effective medium to enhance interaction in the learning process. As the computer network becomes popular, more and more distance learning courses provide online support and make CMC one of the major communication channels. Even teachers in conventional universities and schools begin to adopt CMC to facilitate teaching and learning process. However, as McIsaac and Gunawardena (1996) point out, there has been a considerable growth in distance education, but "literature in the field reveals a conceptually fragmented framework lacking in both theoretical foundation and programmatic research" (p.404) (see also Keegan 1993, Chen 1997, and Garrison 2000).

Since there was no single guiding theory in the field, a major portion of the researches in distance education could only concentrate on evaluations of distance learning programmes, or particular teaching media. For the new communication media of computer conferencing or online conferencing, most of the research focused on users' perceptions of the new mode of learning, rather than the effect on learning (Shin & Chan 2004). Individual empirical studies were engaged in the investigation of how

learners benefited from the online mode of learning, but most of them focused only on one or two specific aspects (e.g. Jiang & Ting 1999; Arbaugh 2000a, 2000b, 2001; Fung 2000; Eom, Ketcherside, Rogers & Starrett 2005), and failed to give a more holistic picture of the teaching and learning process.

Nevertheless, some recent researchers have begun to adapt theories of presence in studying online conferencing. Based on communication theories, notions such as social presence, mediated presence, and transactional presence are introduced to account for the learning through online conferencing (Gunawardena & Zittle 1997; Tu, 2000; Shin 2001, 2002; Richardson & Swan 2003; Russo & Campbell 2004).

Employing the notion of presence, Garrison, Anderson and Archer (2000) attempt to introduce a new model to encompass the major elements that influence learning via online conferencing. Their "Community of Inquiry" model argues that learning through online conferencing occurs within an online community through the interaction of three core elements, i.e., cognitive presence, social presence, and teaching presence. Cognitive presence is "the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication" (Garrison et al. 2000:89). Social presence is defined as "the ability of participants in the community of inquiry to project their personal characteristics into the community, thereby presenting themselves to the other participants as 'real people' " (Garrison et al. 2000:89). Teaching presence consists of two general functions, which are performed mainly by teachers. The first function is the "design of educational experience", which includes the "selection, organization, and primary presentation of course content", and "the design and development of learning activities and assessment." The second function is 'facilitation". Teaching presence is "a means to an end—to support and enhance social and cognitive presence for the purpose of realizing educational outcomes" (Garrison et al. 2000:90).

Garrison and his colleagues, adopting their Community of Inquiry model, have also identified the indicators corresponding to different presences in online conferences. They then conduct a series of content-analysis studies on conference messages, in order to look for postings and segments of postings which show these three types of presences (Garrison et al. 2000, Rourke, Anderson, Garrison & Archer 2001a, Anderson, Rourke, Garrison & Archer 2001, Garrison, Anderson & Archer 2001).

1.2 Statement of the problem

Community of inquiry is a new model being established to characterize the teaching and learning in the setting of text-based online conferencing, and dozens of studies have been conducted concentrating on one of the three presences in the model. Although it is considered to be a promising endeavour in the field (Gibson 2003), empirical studies other than content analysis are not common and the influence of the three presences on students' learning has not been fully investigated. If social, cognitive and teaching presences are the three core elements that determine students' learning, they should have significant influences on students' performance and satisfaction towards the conferencing. However, most of the previous studies were content analyses of conference messages, and they focused on one particular presence. The effect of the entire model on students' learning has not been much revealed.

The present empirical study is an exploration of the explanatory power of the Community of Inquiry model on the use of online conferencing in distance learning courses. It aims to explore if the Community of Inquiry model is an effective model to help understanding students' performance and satisfaction in an online conference.

The interrelationship among the three presences is another issue of interest. In the Community of Inquiry model, the three presences are considered the "elements essential to educational transaction" (Garrison et al. 2001:87). There are claims that

teaching presence supports and enhances social and cognitive presence, while social presence also functions as a support for cognitive and teaching presence (Garrison et al. 2000, Garrison & Anderson 2003). However, the relationship among the three presences has not been clearly presented, nor investigated empirically. The present study is also designed to shed light on this issue.

1.3 Purpose of the study

All the pioneer studies establishing the Community of Inquiry model are content analysis studies (Rourke et al. 2001a, Anderson et al. 2001, Garrison et al. 2001), in which only one particular presence in one particular course is investigated. These studies analyze the discourses of conference in detail, and identify the features of various presences in the messages, but the relation of these presences and students' learning has not been fully examined. Furthermore, single-case content analysis of one particular presence cannot provide much information on the explanatory power of the Community of Inquiry model on the learning through text-based online conferencing, nor on the inter-relationship among the three presences.

Based on the aforementioned content analysis studies by Garrison and Anderson (2003) and others, the present study is designed to further investigate the explanatory power of the model. To be exact, the present study examines if students' participation, attainment and satisfaction in an online conference are associated with the three types of presence. The interrelationship between the three types of presence is also investigated, so as to clarify the structure of the Community of Inquiry model.

Subjects for the study are students enrolled in courses with online support in the Open University of Hong Kong (OUHK). The OUHK is the only distance-learning tertiary institution in Hong Kong, providing distance learning programmes mainly for working adults. The present researcher is working there as a course designer, being responsible

for development of distance learning materials and online support. An online learning platform has been provided in the OUHK for some years, but in-depth investigation on students' use and perceptions of online conference has not been done. Therefore, the present study is also employed to explore the utilization of this communication tool among students in the OUHK.

To conclude, the purpose of the present study is to shed light on the theorizing of learning through online conferencing, evaluate the use of online conference in the OUHK, and provide practical recommendations for teachers and instructional designers of online learning.

1.4 Research questions

In order to explore the use of online conferencing in the OUHK, to examine the explanatory power of the Community of Inquiry model, and clarify the interrelationship among different presences, the following three research questions are to be addressed:

1. How is the online conference used and perceived as a learning tool of distance learning courses among students in the OUHK?

2. Can the "Community of Inquiry" model, in which the three types of "presences" are independent variables, help us to understand students' performance and satisfaction in online conferences?

3. What are the statistical correlations between teaching presence, cognitive presence and social presence in the "Community of Inquiry" model?

1.5 Significance of the study

Since the emergence of distance education more than a hundred years ago, scholars and educationists have been working on the development of new models for this

ever-changing mode of learning. Different models and theories have been proposed and most of them focused on a particular dimension in the process of teaching and learning, especially the media or technologies adopted. The present study focuses on the Community of Inquiry model (Garrison et al. 2000, 2001, Garrison & Anderson 2003), which is a new model of learning through text-based online conferencing. The model is considered "noteworthy" in the recent development of theory in distance education (Gibson 2003: 156). Empirical investigation and testing of this model is therefore very important, before it can be confidently and practically applied.

With respect to theory generation, the present study evaluates the explanatory power of the Community of Inquiry model in online learning. In the previous studies (Rourke et al. 2001a, Anderson et al. 2001, Garrison et al. 2001, etc.), emphasis has been put on the content analysis of various "presences" in conference messages. However, owing to practical difficulties and limitation of resources, most of the studies were single-case studies, and generalisation of findings could not be made. The present study is going to establish a tool and investigate various "presences" in online conferences, which enable a relatively large-scale study to explore the correlations between various presences and students' participation, attainment, and satisfaction. It is anticipated that the present study can have some contribution in the process of development of the new model of distance education.

Practically, the study may provide useful recommendations and strategies for enhancing online text-based asynchronous conferencing. Moderators and instructional designers may get insights on how to utilize the new medium of learning, facilitate their students to have more participation in their online communication, and promote high order critical thinking in the learning process. Moreover, the present study would be the first one in the OUHK, and probably also the first one in Hong Kong, adopting the Community of Inquiry model in studying online conferencing. The findings would

be valuable for exploring students' view of using online conferencing in their learning, and it can improve the delivery mode of online courses in the OUHK.

1.6 Overview

Apart from the introduction, the dissertation is divided into four chapters. The second chapter provides a literature review of the present study, which sketches the emergence of online conferencing in the distance mode of teaching learning and reviews the major instructional theories of online learning. The Community of Inquiry model suggested by Garrison and his colleagues is also discussed in more detail. As the present study is to investigate if students' participation, satisfaction, and attainment in online conferencing are associated with the various presences in the Community of Inquiry model, previous studies concerning these criterion variables are also reviewed.

The third chapter discusses the methodology issues. The research design of the study, instruments involved, sampling, pilot study, data collection and analysis are discussed in detail.

The fourth chapter is a presentation of the research findings, and the answers to the research questions are also discussed. The final chapter discusses the implications for teaching and learning through online conferencing. Recommendations for tutors, instructional designers and pedagogical arrangements are proposed. Lastly, suggestions for further research are also provided.

Chapter 2 - Review of related literature

2.1 Online conferencing in distance learning

Online conferencing has been widely adopted in distance learning programmes since 1990s, which signifies a new generation of distance education (Moore & Kearsley 1996, 2005; Garrison 1989). And now, it is not only popular in distance learning settings, but also commonly adopted in conventional institutions of higher education. As the focus of the present study is on online distance learning, the first part of this chapter critically reviews the development of distance education in the past century, highlighting the value of this new medium of learning in the inherently restricted way of learning. Then, there is a brief description of how online conferencing is being applied in distance learning programmes in various institutions.

In the second section of this chapter, a critical review of various instructional theories of online conferencing is presented. The emergence and strength of the Community of Inquiry model is discussed in detail. The last section of this chapter is devoted to reviewing the literature on the factors influencing students' performance and satisfaction in online conferencing, which are the major criterion variables in the present study.

2.1.1 Emerging of new media in distance education

There are different ways of defining the notion of distance education, but the basic and core feature of it is that "the student and instructor are separated by time and space" (McIsaac & Gunawardena 1996). Moore and Kearsley (1996) try to define distance education in the following frequently quoted paragraph:

> "Distance education is planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of communication by electronic and

other technology, as well as special organizational and administrative arrangements" (p.2).

In their definition, Moore and Kearsley (1996, 2005) thus identify the geographic separation of learner and teacher as the key characteristic of distance education, and all the other listed features are in fact remedies of the separation. Course design, instructional techniques, methods of communication, and organizational and administrative arrangement are employed to enhance effective learning, in spite of the separation of learners and teachers. Among all those features, communication technologies are always the focus of attention. This can be supported by the fact that most of the scholars, when analyzing the development of distance education, identify stages or generations according to the evolution of technology (Garrison 1989, Taylor 1995, 2001 Moore & Kearsley 1996, 2005, and Raymond 2000). Print-based study materials, radio and video broadcast, audio and video cassettes/disks, satellite TV, teleconferencing, computer aided learning packages, world wide web, email, and online conferencing are the media which have been employed all over the years, in order to "provide the student at a distance a richer learning experience and a feeling of connectedness to the education enterprise and instructors" (Shearer 2003:275-276).

All these communication channels or technologies perform two basic functions, i.e., to deliver information to learners, and provide channel for interaction, in spite of the separation of learners and teachers in time and space. One of the greatest improvements made in recent years is the use of multi- and hyper-media materials, which are more effective than traditional text-based materials on paper in presenting information and retain memory (Gerlic & Jausovec 1999). Another improvement is that the latest channels of communication "allow distance education programmes to provide specialized courses for students in remote geographic areas with increasing interactivity between student and teacher" (McIsaac & Gunawardena 1996: 403).

2.1.1.1 Generations of distance education

In order to illustrate the development of distance education, scholars try to identify different generations of distance education over the century. A recent and representative model by Taylor (2001) suggests that there have been 5 generations of distance education. The 5-generation model shows clearly that the development of distance education is in fact parallel to the advancement of technologies (see Table 2.1).

Besides identifying the media adopted in different generations of distance education, Taylor's (2001) conceptual framework also highlights the "characteristics" of the delivery technologies, namely, flexibility, interactivity, refinement, and costing. Flexibility and interactivity are always the major concerns of distance learning (Moore & Kearsley 1996), and they are closely related to the three instructional design factors of distance education suggested by Shearer (2003), namely, access, learner autonomy, and interaction. The development of distance-learning technologies can then be seen as the advancement in the three instructional factors. The next two sections briefly reveal how the latest online learning technologies support a flexible and interactive mode of learning. Special attention is placed on how the use of online conference enhances the interactivity of distance learning.

Table 2.1 Models of Distance Education: A Conceptual Framework (Taylor 2001)

Models of Distance Education and Associated Delivery Technologies	Characteristics of Delivery Technologies					
	Flexibility			Highly refined materials	Advanced interactive delivery	Institutional variable costs approaching zero
	Time	Place	Pace			
First Generation - The Correspondence Model						
• Print	Yes	Yes	Yes	Yes	No	No
Second Generation - The Multi-media Model						
• Print	Yes	Yes	Yes	Yes	No	No
• Audiotape	Yes	Yes	Yes	Yes	No	No
• Videotape	Yes	Yes	Yes	Yes	No	No
• Computer-based learning (eg CML/CAL/IMM)	Yes	Yes	Yes	Yes	Yes	No
• Interactive video (disk and tape)	Yes	Yes	Yes	Yes	Yes	No
Third Generation - The Telelearning Model						
• Audioteleconferencing	No	No	No	No	Yes	No
• Videoconferencing	No	No	No	No	Yes	No
• Audiographic Communication	No	No	No	Yes	Yes	No
• Broadcast TV/Radio and Audioteleconferencing	No	No	No	Yes	Yes	No
Fourth Generation - The Flexible Learning Model						
• Interactive multimedia (IMM) online	Yes	Yes	Yes	Yes	Yes	Yes
• Internet-based access to WWW resources	Yes	Yes	Yes	Yes	Yes	Yes
• Computer mediated communication	Yes	Yes	Yes	Yes	Yes	No
Fifth Generation - The Intelligent Flexible Learning Model						
• Interactive multimedia (IMM) online	Yes	Yes	Yes	Yes	Yes	Yes
• Internet-based access to WWW resources	Yes	Yes	Yes	Yes	Yes	Yes
• Computer mediated communication, using automated response systems.	Yes	Yes	Yes	Yes	Yes	Yes
• Campus portal access to institutional processes and resources	Yes	Yes	Yes	Yes	Yes	Yes

2.1.1.2 Enhancement of access and learner autonomy

The issue of access in distance education is primarily related to the geographic separation of the learner and instructor, where conventional face-to-face teaching is not feasible. However, barriers to access in education can also be caused by other factors, such as gender or cultural differences, financial resources, and so on (Shearer 2003), though these are not the focus of the present study.

The emergence of correspondence education a century ago enabled learners far from their instructors (or school) to access structured learning programme. The later development of technology, like audio and video cassettes/broadcasting, teleconferencing and online learning, enormously enriched the learning experience in terms of the media involved.

The idea of learner autonomy in distance learning was firstly introduced by Moore in 1972, and is referred to as the capacity the learners have in making decisions regarding their own learning (Moore & Kearsley 1996). Similarly, Shearer (2003) defines learner autonomy (or learner control) as "the amount of control the learner has over his or her learning situation" (p.276). In a distance-learning course, learner autonomy means the flexibility of time, space, and pace of study (Mishra 2002). Learner autonomy in different generations of distance education is also shown in Table 2.1.

It can be seen that in the first two generations of distance education, students could have greater learner autonomy, but very little, if any, feedback from their instructor, as the communication channels were for one-way delivery of information. In the third generation, all media support two-way synchronous communication. With the aid of satellite TV or audio conferencing, students can attend a lecture miles away from their instructor. Students can also raise questions, and the instructor can provide immediate feedback in spite of their geographical distance. However, learners become very

limited in their autonomy or control, since have to attend classes following a specific timetable. Moreover, the facilities required for teleconferencing are not common in a household setting.

In the fourth generation, where computer mediated communication (CMC) is employed, learners can have greater autonomy while two-way communication can be maintained in an asynchronous manner. Learners are no longer bounded by rigid teaching schedule, and at the same time, enjoy a high level of interaction between instructor and learners.

2.1.1.3 Enhancement in Interaction

Interaction in the learning process is a recurring theme in educational research. Studies of traditional classrooms have shown a connection between classroom interaction and students' learning and attitude. Bloom (1981) states that it is evident that "interaction between teachers and students in the classroom is the major factor in accounting for the cognitive learning of students, their interest in school subjects and learning, and their confidence in their own capabilities" (p. vi). This is also supported by Vygotsky's (1978) work, in which "social interaction is essential for cognitive development" (Ormrod 2000: 56). Even in behaviourism, the benefit of interaction can be explained by stimulus and response (Yacci 2000). Garrison and Shale (1990) state that all forms of education, delivered face-to-face or at a distance, are essentially interactions between content, students, and teachers.

Liaw and Huang (2000), make it even more explicit, and claim that "it can be assumed that the more interactions that occur between learners and instructors or among learners, the more learners are able to learn and to develop knowledge through self-discovery and personal insight" (p.44).

Successful distance learning, just like learning in a face-to-face setting, must have interaction between students and teachers. Berge (1999) argues that education, whether at a distance or not, is dependent upon two-way communication. Kruh and Murphy (1990) also suggest that quality distance education depends on the interaction and participation of the learners, just like that in traditional face-to-face instruction.

Kruh and Murphy (1990) also state explicitly that it is important that the distance educators purposefully design the interaction and incorporate it into the instructional program. Distance education in the earlier generations was very flexible, but very limited in interactivity. It is the task of developers and instructional designers of distance learning materials to make sure that the study materials are interactive, apart from many other features of good distance learning materials. Interaction, therefore, is always a key issue in distance education (McIsaac & Gunawardena 1996, Moore & Kearsley 1996, Kearley 2000).

To further examine the nature of interaction, Moore (1989) introduces three types of interaction, namely, learner-content interaction, learner-instructor interaction, and learner-learner interaction. The last two are obviously communication between learners and their instructors and among learners themselves. These two types of interaction are taken for granted in conventional classroom teaching, but in a distance education context, special efforts have to be made to introduce them. The learner-content interaction is "the interaction the student has with the subject matter that is presented for study" (Moore & Kearsley 1996:128).

On the top of the three interactions suggested by Moore (1989), Hillman, Willis and Gunawardena (1994) add a new concept of learner-interface interaction. They argue that the interaction between learners and the computer (or other technology) interface is also a critical component, since learners with no knowledge of the technology have

to spend plenty of time to interact with the technology. Therefore, instructional designers have to consider learner-interface interaction so as to enhance successful interactions with the mediating technology. However, as the learner-interface interaction focuses only on "navigational aspects of self-contained courses" and web-based courses, the three levels of interaction described by Moore (1989) are considered to be more central and important to distance education in general (Shearer 2003).

In the first generation of distance education, print materials, such as textbooks, study guides, workbooks, course syllabi, and case studies, served as a fundamental medium of learning. All these kinds of materials are still being used as major components in most of the distance learning institutions today. However, as Barker, Frisbie and Patrick (1989) point out, there is no frequent interaction between teachers and students in this kind of learning, and interaction between fellow students is rare.

Lockwood (1992,1998), however, argues that there can still be "interactions" between learners and the instructional texts, if there are carefully designed learning activities. The three approaches Lockwood suggested in designing activities in print-based distance-learning materials are "tutorial-in-print" (Rowntree 1974), "reflective action guide" (Rowntree 1990), and "dialogue" (Evans & Nation 1989). However, all of these interactions are in fact simulations of previously designed interactions between learners and their instructors. This kind of responses may not be able to cater individual differences among learners.

In the first generation of distance education, therefore, learner-instructor interaction mainly relies on communication by mail, while learner-learner interaction can be totally absent.

In the second generation of distance learning, distance learning materials are mainly printed materials, with the aids of audio/video tapes or computer learning package. Since all these media can serve only one-way communication, the second generation of distance education cannot provide any more interactivity than those in the first generation.

In the third generation, learning through teleconferencing can support synchronous communication between learners and their instructor, and probably among learners themselves. Distance learning courses adopting this technology, therefore, can have very much enhanced interactivity. However, as the communication is in real-time and very often requires certain facilities, learners have to attend "classes" in specific locations according to a preset timetable. The learner autonomy or flexibility is then weakened.

The fourth generation of distance education, which is facilitated with Interactive multimedia online, WWW resources, and CMC support, is a dramatic change when comparing with the previous three generations. Learners in this stage can enjoy multimedia-rich learning materials, and communicate with their instructor as well as their fellows by Internet applications. Computer-mediated communication, such as electronic mails, online conferencing, chat-room, can be either synchronous or asynchronous, depending entirely on the design of the course. With the support of asynchronous modes of communication, such as online conferencing, with instructor, learners can have better flexibility in the time, place and pace in their learning. Therefore, distance education in the fourth generation embraces all three types of interaction suggested by Moore (1989). Since most of the online learning is delivered through WWW, learners who have some experience in browsing web pages will have little difficulty in the learner-interface interaction.

In the fifth generation of distance education suggested by Taylor (2001), which is characterized by an automated response system in CMC, learners' questions or queries can be replied to by pre-developed answers stored in an "intelligent object database" (p.7). By searching with the pre-specified keyword, the system will give "personalized" responses to the question without concurrent human intervention (Taylor 2001: 7). The costing of providing asynchronous interaction can then be greatly reduced, especially when the number of students increases and the database is well developed. However, it is obvious that the automated response provided may not always fulfill the need of individual learners. The online learning system has to be quite complicated and expansive, in order to provide feedback of a satisfactory level. This may explain why the fifth generation of distance education is not yet common.

Nonetheless, it might be claimed that after the adoption of online and Internet facilities in the fourth and fifth generations, students of distance education are enjoying much richer interaction than before. However, even though the use of online communication tools, such as online conference, is getting more and more popular, there have been few empirical researches to explore pedagogical issues concerning the new medium (McIsaac & Gunawardena 1996, Gunawardena & McIsaac 2004).

2.1.2 Online distance learning: some practices

The symbol of the latest development of distance education is the introduction of online or web-based learning programmes (Moore & Kearsley 1996, 2005; Garrison 1997; Taylor 2001). Online learning, e-learning, distributed learning and web-based instruction are all synonymous terms used to describe learning which utilizes the Internet (Paulsen 2003, Tsai & Machado 2002).

As indicated in the previous sections, an online mode of learning utilizes the Internet in two ways, i.e., delivery of multimedia learning materials, and means of communication.

The flexible way of teaching and learning is becoming more and more popular, and institutions of higher education widely adopt online learning in their programmes and courses.

The first university to offer an online degree programme was the University of Phoenix Online. The first online course in Phoenix Online was launched in 1989, which was considered a pioneer of its day (Baker 2000). After the establishment of the World-Wide-Web in 1990-91, and the release of the first widely used web-browser in 1993, the popularity of online courses increased dramatically. In 1992, the first online Ph.D. programme was developed at the California Institute of Integral Studies in collaboration with the Electronic University Network system. In 1993, a "virtual university" offering online courses and programmes was established, i.e., the International University College, now called Jones International University. By the end of 1990s, about two-thirds of the 3200 accredited colleges and graduate schools in the United States offered online courses as a supplement to their campus courses (Clarke 1999, Baker 2000). In the fall of 2003, over 1.98 million of students enrolled in at least one online course in their colleges, and the number by the fall of 2004 was 2.35 million. The number is still in its rapid growth. Therefore, it is not astonishing to learn that 56% of the schools in the States agree that online education is critical to their long-term strategy (Allen & Seaman 2005).

In Britain, the well-established Open University of the United Kingdom (UKOU) also introduced online conferencing into their distance learning courses in 1988. By 2000, some 100,000 students enrolled in courses supported by the online communication tool. In 2003, the number was up to 150,000 (Salmon 2003). Besides the OUUK, there are more and more traditional British universities beginning to offer pure online undergraduate and postgraduate courses. In fact, most of the universities in the UK have adopted online learning support to facilitate teaching and learning in their

traditional on-campus programmes. A similar revolution has also happened in colleges and universities in Europe, Australia and many Asian countries (e.g., PLS Ramboll Management 2004, Open Universities Australia 2006). Most of the open and distance learning institutions, including those providing online programmes or more traditional distance learning packages, are now providing online support and online communication channels (CMC) for their students.

Nevertheless, the same notion of online education can represent quite different practices when examined at a more sophisticated level. To classify different practices of online education, Harasim (1998) proposes there can be three modes of online education:

- Adjunct mode: networks are used to enhance regular distance education;
- Mix mode: a significant portion of the educational activity occurs online, while the remainder occurs in traditional distance education;
- Totally online mode: all education or training activity is conducted online.

Harasim's classification is mainly based on the extent Internet is used in distance learning process, and it can well describe different practices of online learning in various institutions. In many traditional distance learning institutions, the teaching is still mainly delivered by correspondence materials. However, as email is so common at the moment, teachers and students are quite ready to make email a communication medium between teachers and students. Students can raise a question by email, and their teacher can give answer through the same channel. In addition, some online courses in adjunct mode may also deliver supplementary materials or announcement through the web site of their institution. However, none of the networked activities and materials is compulsory or counted in students' final score.

Mixed mode is now more common in the field of distance education. Students having mixed mode of distance education usually can access learning materials through the Internet, and communicate with their teachers via email and online conference. The other part of teaching and learning may be delivered by face-to-face teaching or correspondence materials. Online conference is usually considered to be one of the major media of academic discussion. Teachers raise some questions for discussion in the conference, and students are required to take part in the discussion. Student participation in the conference is also monitored, and their performance may also be considered in their final grade.

For the totally online courses or programmes, students can access all the learning materials via the Internet, and communicate with their teachers and administrative office by online communication channels. The majority of their learning experience is through the Internet. Just like the mixed mode of distance education, online conference is also one of the major channels for academic activities.

Allen and Seaman (2005), when describing the three types of online learning suggested by Harasim (1998), adopt quite different names, i.e., web-facilitated course, blended course, and online course. The different notions, however, are only synonyms to Harasim's earlier suggestions.

2.1.2.1 Use of CMC in online learning

In online learning, media-rich Web pages are used to deliver information and learner-content interaction, while CMC tools are for communication among learners themselves, and between learners and their teacher. The most popular CMC tools in distance learning courses are email and online conference. It can be expected that email is mainly used for personal communication, while online conference is more suitable for one-to-many communication. The online conference, therefore, has been

made to serve as the major teaching and collaborative learning tool in most of the online courses.

There are advantages adopting this kind of text-based communication over traditional oral communications between and among teachers and learners. As oral communication tends to be fast-paced, spontaneous, fleeting and less structured than text-based communication, it might be less favourable to disciplined and rigorous thinking (Garrison & Anderson 2003). Asynchronous text-based communication, however, provides a 24-hour platform, and students can have plenty of time for reflection, analysis, and composition. The text-based communication, when used in academic contexts, encourages deep thinking and retrospective analysis (Garrison 1997, 2000). Since the whole transcript of discussion is stored in the system, latecomers can still trace back the whole discussion without losing any details. Another feature of online conference that favours active participation in discussion is that it focuses only on the messages, but not characteristics of the speakers. The socially equalizing environment of discussion makes everyone appear the same in text, regardless of his/her gender, appearance, paces of speech, and so on (Berge 1999, Salmon 2000). Garrison et al (2000) even argue that text-based communication may actually be preferable to oral communication in promoting higher-order cognitive learning. In fact, a number of writers suggest that text-based communication is closely connected with careful and critical thinking (e.g., Applebee 1984, Fulwiler 1987, White 1993).

As there are different modes of online learning, the role of online conference in different online courses is not always the same. For those courses in totally online mode, an online communication is almost the sole channel of communication between learners and their tutors. It is quite common that courses of this kind would make participation in online discussion a compulsory task to complete the course. Students are normally asked to respond to postings by their tutor or other students on a regular

basis. Their tutors examine their "contributions" carefully and scores are assigned. Collaborative tasks among students are also common in this kind of online course. Students are assigned into smaller groups, and members in the same group have to complete a task collaboratively. Therefore, the frequency and performance of students' participation in the online course are often counted in the assessment.

Nonetheless, online conference in those courses adopting an adjunct mode (Harasim 1998) of online learning serves only a supportive and supplementary role in the course of study. Students' participation in these conferences is entirely on a voluntary basis.

2.1.2.2 Online learning in the Open University of Hong Kong

The subjects of the present study are students from the Open University of Hong Kong (OUHK), which is the only distance learning institution offering various levels of degree programmes in Hong Kong. This section briefly introduces some background of the university, and the development of online learning in the OUHK. Prior studies related to online learning in the OUHK, especially those involving online conferencing, are also reviewed.

The OUHK was established with the title of Open Learning Institute (OLI) of Hong Kong in 1989, mainly funded by Hong Kong government. Similar to the Open University of UK (UKOU), the mode of teaching in the OUHK depends mainly on study units, textbooks, and, for some courses, other audiovisual materials. When compared with UKOU, courses in the OUHK involve more frequent and regular tutorial sessions. Students normally are provided a face-to-face tutorial session every fortnight. One of the reasons may be that adult learners in Hong Kong are not confident with the distance mode of learning. Another factor is that Hong Kong is only a small city, and the travel for more regular face-to-face sessions is still affordable for most of the people in Hong Kong. In addition, students can also have telephone

tutorials with their tutors. However, as all these tutorial sessions are not compulsory, the self-contained course material is still the key component in the OUHK.

When compared with distance learning institutions in western developed countries, the online course development in the OUHK fell a bit behind. OUHK launched its pilot online course as a research project in 1997 and the first batch of online courses in the medium of English were formally launched in 1998, adopting Web-CT platform. However, the Web-CT was not fully compatible with Chinese character, and an online learning platform, i.e., Online Learning Environment (OLE), was then developed in order to cater for the courses offered in the medium of Chinese.

The Chinese OLE was formally introduced in 2000. In 2004, the Web-CT platform for English-medium courses was also replaced by the same self-developed online platform. Including courses in both media of instruction, the OUHK delivered more than 300 courses online by April 2006.

However, the online component of distance learning courses in the OUHK has been playing only a supplementary role. Having considered the fact that there are still some of the OUHK students who do not have access to Internet at home, and some students are not confident with their own information and communication technology skills, the online materials are delivered in parallel to the traditional printed and audio-visual materials. Students of the OUHK receive a self-learning package, which consists of study schedule, detailed study units and assignments. Students have to buy textbooks for themselves and they can attend regular face-to-face tutorials. In the online learning platform, students can get access to all the study units and assignments. Some students can also submit their assignments through the online platform. Communication channels provided in the OUHK online platform include email and online conference (the "discussion board").

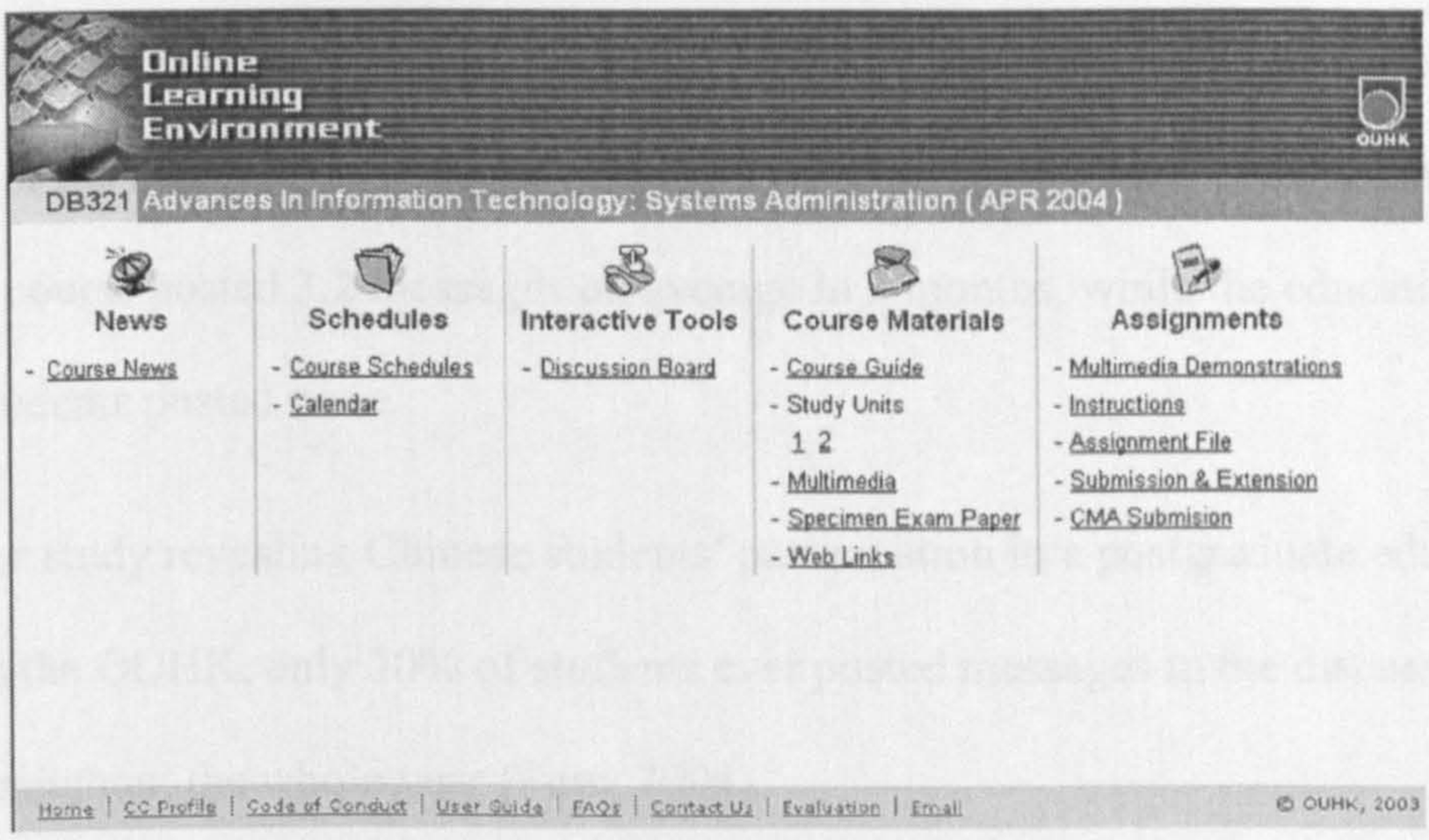


Figure 2.1 A screen capture of the OLE in the OUHK

There have been a number of independent studies evaluating the OLE in the OUHK. A survey study conducted by Choi and Tsang (2001) reveals that only 21.3% (n=240) of respondents logged-in the OLE 2 times or more in a week. However, data also reflect that students were quite positive towards the learning support. On a 5-point Likert scale, 64.2% of the respondents agreed or strongly agreed that the online conference in the platform provided more chance of communication ($\bar{x} = 3.650$). About 45.5% of them found online conferencing among students helpful to their study ($\bar{x} = 3.429$), and 50.5% found the interaction between learners and tutor beneficial ($\bar{x} = 3.475$). In another study on courses in the medium of English, Woo et al (2002) also revealed that students held a positive attitude towards the usefulness of the online platform ($\bar{x} = 4.2675$ in a 7-point Likert scale, $n = 114$).

In a more comprehensive study on OUHK students' participation in online discussion, Tsang, Choi and Tam (2002) notice that students were also holding quite positive attitudes toward the usefulness of online discussion to their learning ($\bar{x} = 3.68$, $s.d.$= 0.67 on a 5-point scale, $n = 236$). For students' participation in online conference, the data varied greatly between courses. On average, students logged in the online platform 77.8 times in a period of 3 month. However, in a particular business course,

the average was as high as 284.4 times, while in an education course, the average was only 3. For the number of messages posted on the discussion board, the students in the business course posted 3.2 messages on average in 3 months, while the education course students posted none.

In another study revealing Chinese students' participation in a postgraduate education course in the OUHK, only 30% of students ever posted messages in the discussion board throughout the whole year (Fung 2004).

In fact, it is generally believed that students in Hong Kong are used to a more traditional and transmissive mode of teaching and a receptive mode of learning (Lai & Tang 1999, Fung 2000), and discussion and presentation are not very popular classroom activities in schools. In a study investigating students' preference to tutorial styles in the OUHK, it was also reported that most students preferred "tutors lecture to the whole group", and fewer students preferred small group discussion or students' presentation (Fung & Carr 1999). In another small-scale survey conducted in the OUHK, Hao and Fung (2006) report that 85% of the respondents (n=64) in two Mathematics courses preferred face-to-face tutorials rather than online discussion board, though the respondents generally admitted that the discussion board was helpful to their study. On 3-point scale, students in course one ($\bar{x} = 2.13$, $s.d.= 0.91$, $n = 34$) and course two ($\bar{x} = 2.37$, $s.d.= 0.93$, $n = 30$) both agreed with the usefulness of the discussion board.

From the aforementioned studies on OUHK, it is worth noticing that though students generally accept that online discussion can be beneficial to their learning, they are not very enthusiastic to actually participate in the activity.

2.2 Instructional theories of online conferencing: A critical review

It has long been criticized that the development of distance education was directed by modern technology, rather than theory and research (McIsaac & Gunawardena 1996, Gunawardena & McIsaac 2004). Distance education was even criticized as being a hodgepodge of ideas and practices taken form traditional classroom settings (Garrison 1990). Most of the new technologies adopted in distance education were mainly employed to bridge the geographical distance and enhance interaction, i.e., replicating face-to-face instruction by mediated means (Garrison 2000). The major concern in distance learning was the effectiveness and efficiency of various media and technologies.

Earlier researchers have tried to prove that students could learn equally well by means of different media of distance learning. The so-called "no-significance phenomenon" was supported once and again by hundreds of evaluation studies (see for example, Russell 1999). Similar meta-analyses on media researches have shown that it is not the media of instruction that affects the learning of students, but the instructional strategies built into the learning material. Technologies are simply vehicles of delivering instruction, but do not themselves influence student achievement (Clark 1983, in Ally 2004). Schramm (1977) argues that learning in distance education is influenced more by the teaching content and instructional strategy than by the type of technology used to deliver instruction. Therefore, more and more researchers suggest that in the new century of distance education, it is the teaching and learning theory of distance education that should be the focus of concern (Garrison 2000, Anderson 2004, McIsaac & Gunawardena 2004). McIsaac and Gunawardena (2004) point out explicitly that

> "one of the critical challenges the field of distance education has faced is the need for continuous development of theory necessitated by the rapid changes brought by the development of new communications technologies used as delivery media.

> Theorists are challenged to adapted theories to understand the learning environments created by new technological developments or to develop new theories to explain or make sense of these new and emerging technologies." (p.359)

Garrison (2000), after reviewing the significant theoretical developments and contributions to the study of distance education, concludes that "the 21st century represents the post-industrial era where transactional issues (i.e., teaching and learning) will predominate over structural constraints (i.e., geographical distance)" (p.2). Online conference, as a major interactive medium between students and their tutors, and relevant learning theories have also received much attention.

The following sections will review the major endeavours related to learning theory of online conferencing. The discussion starts with a more traditional distance learning theory, i.e., transactional distance, and its application in online learning. Salmon's (2000, 2003) Five-stage model, theories of presence (including social presence, mediated presence and transactional presence), and community of inquiry model are also reviewed. The focus of this section is put on the community of inquiry model (Garrison & Anderson 2003), which is still in its developing stage but is receiving much attention in the field of online learning (Gibson 2003).

2.2.1 Transactional distance

The theory of transactional distance was first introduced by Moore (1973, 1990, 1993), and is one of the most popular theories of distance education throughout the decades. Moore (1993) declares that the concept of transaction was derived from John Dewey and further developed by Boyd and Apps (1980). Transaction, according to Boyd and Apps (1980: 5), "connotes the interplay among the environment, the individuals and the patterns of behaviours in a situation". Moore carried this idea a step further and proposed that the transaction that we called distance education is "the interplay

between people who are teachers and learners, in environments that have the special characteristic of being separate from one another, and a consequent set of special teaching and learning behaviours" (Moore & Kearsley 2005:224). He argues that distance can be a pedagogical, and not only geographical phenomenon. Transactional distance is the distance of understandings and perceptions that might lead to a communication gap or a psychological space of potential misunderstandings between people (Moore & Kearsley 1996, 2005).

Rumble (1986) points out that Moore's concept of transactional distance can be applied not only in distance education, but also in other educational settings, including face-to-face teaching. In order to have effective, deliberate, and planned learning, Moore (1993) believes transactional distance has to be overcome. In distance education, nevertheless, the separation of teacher and learner is so significant that special teaching-learning strategies and techniques have to be employed so as to reduce the distance between them. Moore argues that education offers a continuum of transactions from less distant, where there is more interaction, to more distant, where there may be less interaction. Transactional distance is actually determined by the way and to what extent instructors, learners, and the learning environments interact with one another (Moore & Kearsley 1996, 2005).

Moore (1993) suggests that the extent of transactional distance in an educational programme is determined by dialogue, structure and learner autonomy. Dialogue, according to Moore (1990) refers to the teacher-learner interaction, specifically the communicative transaction of giving instruction and responding. The importance of teacher-learner interaction is emphasized by many empirical studies, and dialogue has long become a crucial element in distance education (Hillman et al. 1994, Shale & Garrison 1990, Moore 1990). Structure refers to elements of course design, such as learning objectives, teaching strategies, evaluation methods, etc. Moore believes that

structure expresses the rigidity or flexibility of a course, and therefore, reflects the programme's capacity to respond to a learner's individual needs (Moore 1983). He observes that in a highly structured educational programme, the objectives and methods used are inflexible. On the contrary, as the interaction between a teacher and a learner, i.e. dialogue, increases, the existing programme's structure decreases to better accommodate the learner's needs. Moore concludes that high structure and low dialogue yield greater transactional distance; and low structure and high dialogue give lesser transactional distance (Moore 1993).

Learner autonomy refers to "the extent to which the learner in an educational programme is able to determine the selection of objectives, resources and procedures, and the evaluation design" (Moore, 1983:82). Unlike the other two elements of transactional distance, the direction of influence of learner autonomy on distance education was not clearly specified (Chen 1997). Moore (1993) noted that when the transactional distance is great, students have to exercise greater learner autonomy.

This theory seems appealing and is well known in the field of distance education, but few empirical studies have been done to verify the theory (Saba & Shearer 1994, Moore & Kearsley 1996, Chen 1997, Dron 2002). Garrison (2000) criticizes that "the exact nature of the interrelationships among structure, dialog and autonomy is not clear", and he reveals that there is confusion around "whether structure and dialog are variables, clusters or dimensions" (p.9).

Chen (2001a) argues that the conceptualization of transactional distance remains insufficiently explored, especially when distance education has evolved in a telecommunication era. In line with Chen (2001a), Stein et al (2005) state that there is no major study examining how transactional distance operates in an online learning environment. Some researchers on distance education have tried to adopt the theory of

distance education in online distance learning, but it is found that the theory of transactional distance is only partially supported by empirical studies (e.g., Saba 1988, Saba & Shearer 1994, Chen 2001a, 2001b, Rovai 2002).

In fact, under the setting of online learning, the synchronous and asynchronous channel of communication provide a strong base for dialogue, and they can be part of the course design, i.e., structure, and planned by the instructors (Stein et al 2005). The boundary between structure and dialogue suggested by Moore becomes much more fluid in the context of online communication. After reviewing the major empirical studies on the theory of transactional distance, Stein et al (2005) have the following conclusion.

> "Although the literature supports the presence of elements of transactional distance, there is an incomplete understanding of how they work with one another in the context of learner technical expertise in Web-supported and Web-delivered courses." (p.108)

And this is why scholars in the field of online learning are trying to establish a new theory of learning, and why the transactional distance theory has lost its prominence in recent studies.

2.2.2 Salmon's five-stage model

Since the emergence of the communication tools through Internet, such as email and online conference, researchers have begun to notice the nature of "mediated communication" through the computer network and its strength in enhancing distance education (Berge & Collins 1995, Garrison 1997, McAteer, Tolmie, Duffy & Corbett 1997). While some traditional learning theories of distance education, such as transactional distance, could not be perfectly applied to this new technology, Salmon's (2000, 2003) five-stage model, is grounded in her research entirely on online conferencing. Based on content analysis of thousands of conference messages and

focus group interviews, Salmon explored the "key activities for learners online, the significant technical skills needed, and the kind of support and help required" (Salmon 2003: 27). As a consequence, Salmon (2000, 2003) has identified five stages that online learners progress through during their learning experience of an online conference, and the five-stage model provides a structured, incremental approach to various stages of participation in an online conference (Figure 2.2).

In the first stage, i.e., access and motivation, the online instructor or, in Salmon's term, e-moderator should ensure that all learners are able to access the online course content and the communication tools, i.e. online conference. Instructors should provide adequate support when learners have technical or motivational problems which are preventing access. In the second stage, i.e., online socialization, participants are expected to interact socially with others through the online conference, in order to develop a sense of group identity and empathy among other participants. In this stage, e-moderators should encourage group discussion and social interaction among learners by creating an atmosphere in which participants feel safe in expressing opinions.

The third stage involves the exchange of information among learners. Interaction in this stage is based primarily on the information or issues presented by the e-moderator. Learners at this stage find it easier and more enjoyable to share information online, and participate more actively. E-moderators should master those important moderating skills, such as summarizing, guiding and weaving, so as to facilitate the shared learning experience.

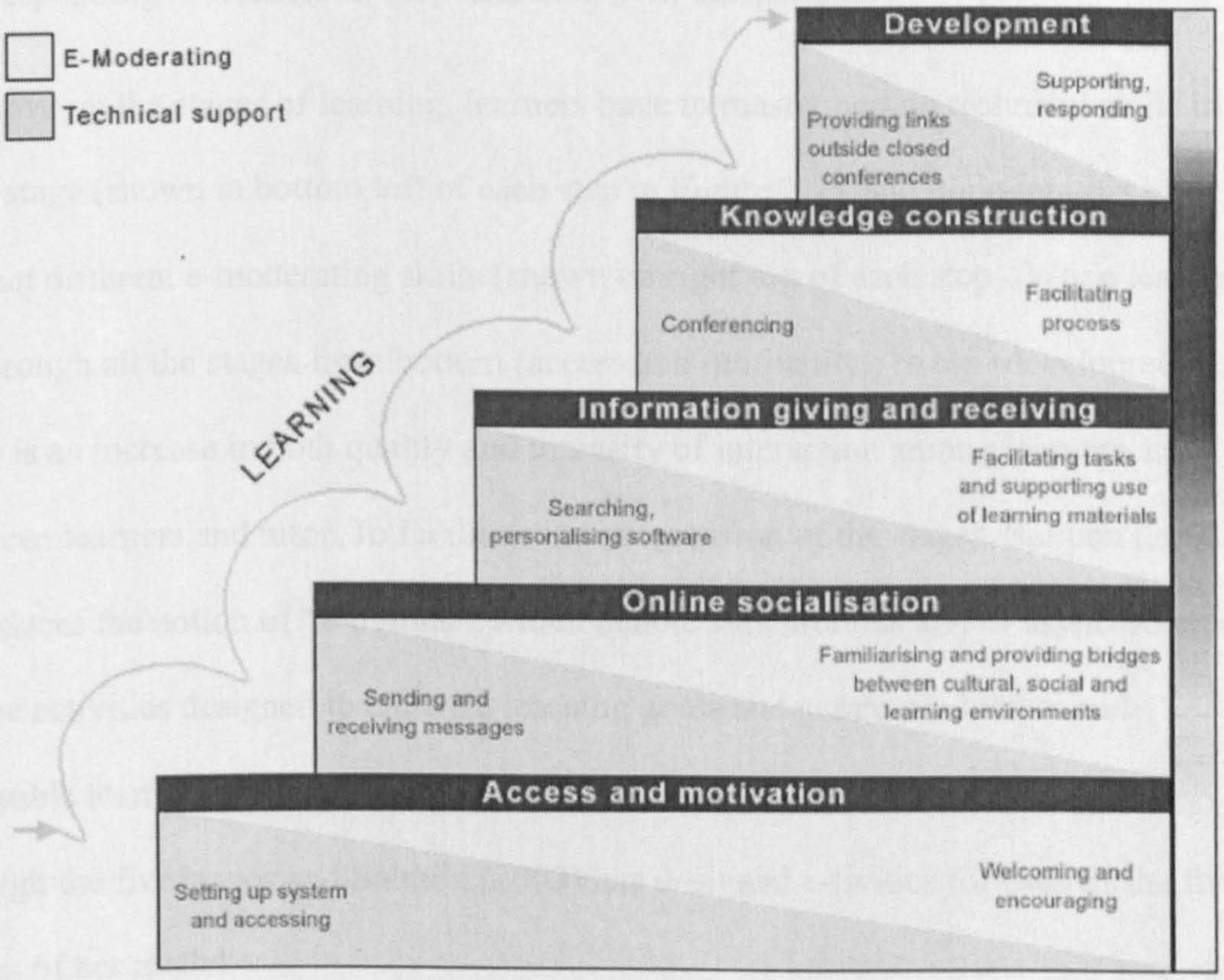


Figure 2.2 Salmon's Five-stage model (Salmon 2000: 26)

In the fourth stage, which is knowledge construction, learners begin constructing knowledge rather than simply receiving and forwarding information. Learners share personal knowledge and opinions, criticize other's opinions and defend their own in the discussions. During this stage, the role of the e-moderator changes from leading course activities to facilitating discussion. E-moderators can assist participants by stimulating, summarizing, and weaving together course discussions.

In the last stage (development), learners have developed confidence with the theory and practice of participating in an online course. Taking a collaborative approach, learners begin to consolidate the acquired knowledge and reflection in the discussion. E-moderators at this stage spend less time facilitating discussions, instead supporting

and responding to learners as they lead their own discussions.

To move up the stages of learning, learners have to master certain technical skills in each stage (shown in bottom left of each step in Figure 2.2), and e-moderators have to present different e-moderating skills (shown on right top of each step). When learners go through all the stages from bottom (access and motivation) to top (development), there is an increase in both quality and intensity of interaction among learners and between learners and tutor. To facilitate the progression of the stages, Salmon (2003) introduces the notion of "e-tivities", which denote synchronous and/or asynchronous online activities designed to enhance learning goals and create productive and enjoyable learning environment. E-tivities are essential to help learners progress through the five stages and Salmon (2003) has designed e-tivities for each of the five stages of her model.

Salmon (2003) argues that knowledge of these stages can help e-moderators and course designers create online learning experiences that promote success. Salmon (2003) states clearly that

> "Given appropriate technical support, e-moderation and a purpose for taking part in CMC, nearly all participants will progress through these stages of use in CMC (...) The chief benefit of using the model to design a course with CMC is that you know how participants are likely to exploit the system at each stage and you can avoid pitfalls. The results should be a higher participation rate and increased student satisfaction." (p. 30)

The five-stage model suggests systematic procedures to facilitate learning through online conferencing, and e-moderators can be trained according to the required skills in various stages. Obviously, Salmon's model focuses mainly on the role of the instructor as a facilitator, without much regard to learners' roles and the external and environmental factors. Odin (2003) asserts that it may easily lead to a misconception that online teaching is merely facilitation. Furthermore, while affirming the value of

identifying different stages in online learning experience, Odin (2003) argues that the five stages are only different aspects of managing an online learning environment. Feldstein (2002) also points out that Salmon's five-stage model is descriptive by its nature, and it "describes what often happens naturally in a class, whether or not the e-moderator consciously shepherds the students through the five stage process" (E-moderating section, para. 8).

In fact, the first three stages can be seen as preparatory stages of effective online learning, and some learners have been well-prepared before starting an online course. So Odin (2003: 1) suggests that it may not be appropriate to label them as five "sequentially unfolding stages" as it gives an impression that "each stage somehow has the same degree of relevance to the overall learning process for every student". The last two stages of Salmon's model are essential to a "collaborative learning process" (Odin 2003: 1), but Odin (2003) criticizes the separation of conception in the two stages. Odin states that personal reflection and development in the fifth stage and the exploratory collaborative learning that involves the construction of knowledge in the fourth stage cannot be easily separated, as "the exploration and construction of knowledge constantly involve personal reflection" (p.2).

Another shortfall of the model is that there are not clear criteria for accomplishment in each of the five stages, and the factors of successful online learning are not operationalized. Empirical evaluation or testing of the model, therefore, cannot be conducted. In fact, Salmon does not intend to propose an input-output type of model explaining online learning, and the evaluation of the model has not been much addressed. Therefore, the applicability of the five-stage model cannot be easily verified in an empirical manner.

2.2.3 Theories of presence

Apart from Salmon's endeavour in establishing a model of online learning, there is also a collection of theories associated with the notion of "presence", which is drawing increasing attention in the field (Tammelin 1998).

A common conceptualization of presence is "the illusion of being there, whether 'there' exists in the physical space or not" (Biocca 1997). The concept of presence has been applied in various fields, including non-educational settings, such as remote-control systems and industrial robots. Nonetheless, the concept of presence is also relevant in the context of mediated communication and distance education. As the same notion has been applied in different scenarios, the concept of presence is also multifaceted (Witmer & Singer 1998). After having extensively review the relevant literature, Lombard and Ditton (1997) report that there are different conceptualizations of presence suggested by different researchers, and thus corresponding to different operational definitions. However, Lombard and Ditton (1997) try to encompass all the conceptualizations of presence by defining presence as "the perceptual illusion of non-mediation", in which

> "[t]he term 'perceptual' indicates that this phenomenon involves continuous (real time) responses of the human sensory, cognitive, and affective processing systems to objects and entities in a person's environment. An 'illusion of nonmediation' occurs when a person fails to perceive or acknowledge the existence of a medium in his/her communication environment and responds as he/she would if the medium were not there." (Lombard & Dittion 1997, Presence explicated section, para. 1)

In the context of online education, presence "refers to a student's sense of being in and belonging in a course and the ability to interact with other students and an instructor although physical contact is not available" (Picciano 2002: 22).

There have been a number of studies making presence in online courses the major

concern, and the concept has been refined and categorized. Notions such as social presence (Gunarwardena 1995; Gunarwardena & Zittle 1997; Tu 2000, 2001; Picciano 2002; Richardson & Swan 2003), transactional presence (Shin 2001, 2002, 2003; Shin & Chan 2004), and mediated presence (Russo & Campbell 2004) evolved in the past decade, and each of them represent a particular dimension of presence. Although there are different focuses on the various presences, the research studies concerning various presences suggest that an enhanced sense of presence improves individual and group learning as well as other variables related to performance in distance education (Fontaine 2002).

Social presence

The kind of presence that receives much attention in the field of online conference is social presence (Sanders & Wiseman 1990, Walter 1992, Gunawardena & McIsaac 1996, Tu 2000). The idea of social presence comes originally from communication theory, and was defined as the "degree of salience of the other person in the (mediated) interaction and the consequent salience of the interpersonal relationships" (Short, Williams & Christie 1976: 65). In the setting of mediated communication, this refers to "the degree to which a person is perceived as 'real' in mediated communication" (Richardson & Swan 2003: 70), or the "degree of awareness of another person in an interaction and the consequent appreciation of an interpersonal relationship" (Tu 2000:6).

Originally, Short et al (1976) considered social presence an inherent feature of particular media, and they contended that it "varies among different media, it affects the nature of the interaction and it interacts with the purpose of the interaction to influence the medium chosen by the individual who wishes to communicate" (Short et al. 1976). Later researchers, however, argue that social presence is not simply

determined by the medium concerned. Gunawardena and Zittle (1997) argue that social presence can be taught or cultured among participants, and they reject the view that social presence is largely an attribute of the communication medium. Their research demonstrated that social presence is both a factor of the medium and of the communicators and the subject's presence in a sequence of interactions (Gunawardena & Zittle 1997). Several studies have shown that the perception of the degree of social presence in a single setting of mediated interaction varies among participants (Perse et al. 1992, Gunawardena 1995, Gunawardena & Zittle 1997, Tu 2000).

It is worth noticing that the single concept of social presence is operationalized quite differently among researchers involving text-based online conference or online learning. Having acknowledged that there are two major concepts related to social presence, i.e., intimacy and immediacy (Short et al. 1976), Gunawardena and Zittle (1997) argue that the text-based nature of CMC does not contribute much to the former. In their study measuring social presence in CMC, Gunawardena and Zittle (1997) focus mainly only on the immediacy aspect of social presence, and their social presence scale comprises 14 questionnaire items embodying the concept of immediacy.

Tu (2000, 2001) however, proposes a three-dimensional model of social presence after a series of qualitative and quantitative studies. The three dimensions suggested by Tu (2001) are social context, online communication, and interactivity. Social context is determined by the CMC characteristics and learners' perceptions of the CMC environment. Online communication consists of various attributes of the language used and the applications of that online language. Interactivity includes the activities learners engage in and the communication styles they use (Tu & McIssac 2002). It is *therefore obvious that the concept of social* presence in the context of online conference is still in its emerging stage, and its definition has not yet been consolidated.

There are different operationalizations of social presence, and the effect of the various conceptions of social presence on learning through CMC has been recurrently investigated. Gunawardena and Zittle (1997) examined the impact of social presence on student satisfaction with online distance learning. Their data suggested that 60% of variance in overall satisfaction with the course could be explained by students' perceptions of social presence. Gunawardena and Duphorne (2000), in addition, show that there is a positive correlation ($r = 0.44$) between social presence and satisfaction in their study of online courses. Tu (2000) concludes in an empirical study that when a student perceives a high degree of *social presence, a high level of interaction will* normally occur. Before the establishment of the Community of Inquiry model, Garrison (1997) agrees that social presence is important to enhance teaching and learning in online conferences.

Transactional presence

Focusing on experience in distance learning, Shin (2001, 2002, 2003) proposes the notion of transactional presence, which is defined as a distance learner's sense of "the availability of, and connectedness with teachers, peers, and the institution" (Shin 2003: 69) Obviously, the notion of transactional presence is broader than that of social presence as it includes three different elements, i.e., teacher transactional presence, peer transactional presence and institution transactional presence. Shin (2003) reports that the transactional presence students perceived is significantly related to satisfaction and intent to persist. Shin and Chan (2004), in another empirical study, focus on the effect of institution transactional presence, which is defined as "the degree to which a distance student perceives the availability of support services in the institution while feeling connected to the institution" (p.279). They report that the institutional presence is significantly correlated with learners' learning outcomes, satisfaction as well as intent-to-persist.

Mediated presence

Russo and Campbell (2004) introduce a comparatively narrow concept of presence, i.e., mediated presence, which "incorporates the original meaning of social presence as a characteristic of a particular communication medium but focuses on presence as a function of communication interaction that it is constrained or enabled by the medium" (p.219). Unlike the social and transactional presence, the effect of the mediated presence on online learning has not yet been investigated empirically.

In short, over the years, various concepts of presence have been evolved and applied in the study of mediated communication in online courses. However, most of the different concepts aforementioned cover only a particular aspect of teaching and learning. The transactional presence is a broader concept, but none of its three components focus on the process of teaching and learning, especially the use of online conferences. By adopting any one of the presences mentioned above, one could hardly portray how knowledge is constructed among participants in an online conference. Besides the most thoroughly studied concept, social presence, all the other presences have only been proposed and empirically investigated by individual researchers. Even for social presence, the operational definition still varies among studies by different researchers.

The emergence of the model of Community of Inquiry has brought new power of the notion of presence in mediated learning.

2.2.4 Community of inquiry

In order to fully cater for the new mode of learning through text-based online conferencing, Garrison and his co-investigators have proposed a new conceptual model to explain the educational experience of learners in a networked environment, namely, the Community of Inquiry (CoI) Model, which encompasses the idea of various presences.

The notion of community of inquiry was originated by Lipman (1991), who refers to it as an essential context to facilitate critical thinking and deep learning. In examining the teaching and learning through online asynchronous, text-based computer conference, Garrison et al. (2000, 2001) argue that a "community of inquiry" is extremely valuable for higher-order thinking. In such an online community, learners construct and reconstruct experience and knowledge through critical analysis of subject matter, questioning, and the challenging of assumptions. In the mediated communication setting, social interaction, cognitive thinking and teaching support can then be reflected by social, cognitive and teaching presence in the CoI model. Garrison, et al. (2000, 2001) argue that learning occurs within the community through the interaction of three presences.

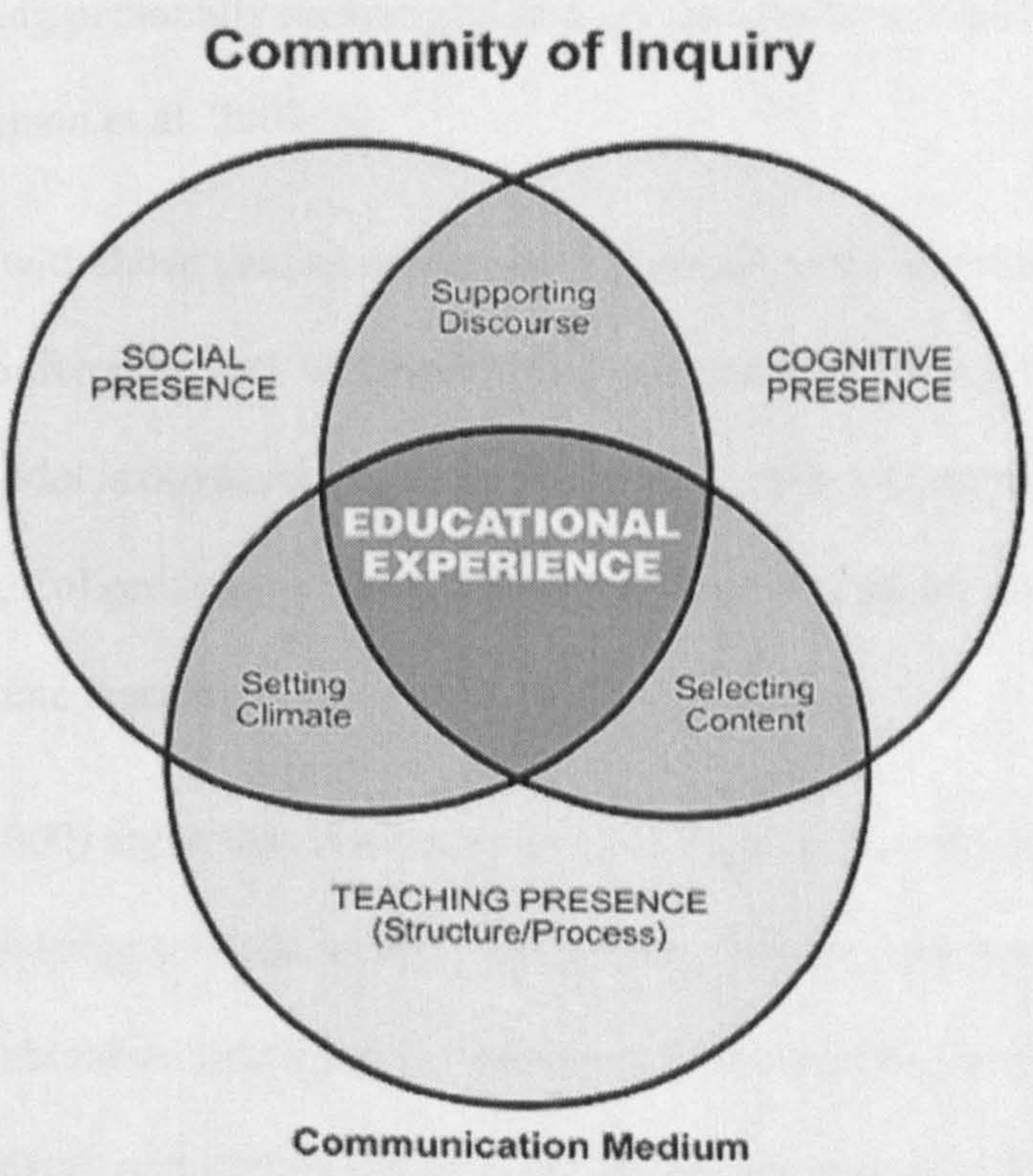


Figure 2.3 Community of Inquiry (from Garrison, Anderson & Archer 2000: 88)

Among the various presences proposed in earlier studies, Garrison and his colleagues have only adopted social presence, and coined the notions of cognitive presence and teaching presence (Garrison et al. 2000, Garrison & Anderson 2003). In the medium of text-based asynchronous communication, Garrison et al. (2000) argue that the three core components of the community of inquiry construct a favourable platform, in which valuable educational experience can be cultivated.

Cognitive presence is defined as the extent to which participants in a CoI are able to "construct meaning through sustained communication" (Garrison et al. 2000: 89). *Social presence* is the ability of participants in CoI to project their personal characteristics into the community, "thereby presenting themselves to the other participants as 'real people'" (Garrison et al. 2000: 89). *Teaching presence* is defined as "the design, facilitation and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes" (Anderson et al. 2001: 5).

When compared with those studies making social presence the sole factor of learning through online conference, such as those by Gunawardena & Zittle (1997) or Tu (2000, 2001), the CoI model is obviously more encompassing. When compared with Salmon's five-stage model, CoI provides a more well-defined or manipulable collection of factors that facilitate learning.

Garrison et al. (2000) argue that in a community of inquiry, learners learn through constructing knowledge by collaborative discussion. Garrison and Archer (2000: 11) refer it as a "collaborative constructivist perspective" on teaching and learning transaction, and they regard an educational experience as "a collaborative communication process for the purpose of constructing meaningful and worthwhile knowledge" (Garrison et al. 2000: 92). The underlying assumption of this theoretical

perspective is that knowledge is motivated, organized, and communicated in the context of social interaction. As Clements and Nastassi (1988) explain, cognitive development requires that individuals face others who contradict their own intuitively derived concepts and points of view (decentration), and thereby create cognitive conflicts (disequilibration) whose resolutions result in the construction of higher forms of reasoning. Based on this theory, the pedagogical value of online conferencing to support higher-order educational objectives will depend on its ability to facilitate open communication and reflective discourse.

The following sections will introduce the three key elements of community of inquiry in more detail.

2.2.4.1 Cognitive presence

Among the three elements in the model of CoI, "cognitive presence is a vital element in critical thinking, a process and outcome that is frequently presented as the ostensible goal of all higher education" (Garrison et al. 2001:89). In fact, cognitive processes and outcomes are the ultimate concerns in any educational setting. Social presence and teaching presence are facilitators of the learning process (Garrison & Anderson 2003).

In order to operationalize and evaluate the cognitive presence in online conference messages, Garrison et al. (2001) adopt Dewey's (1933) practical inquiry model which defines four phrases to describe the process of critical thinking (see figure 2.4). Cognitive presence is then defined and manifested through the practical inquiry model (Garrison & Anderson 2003).

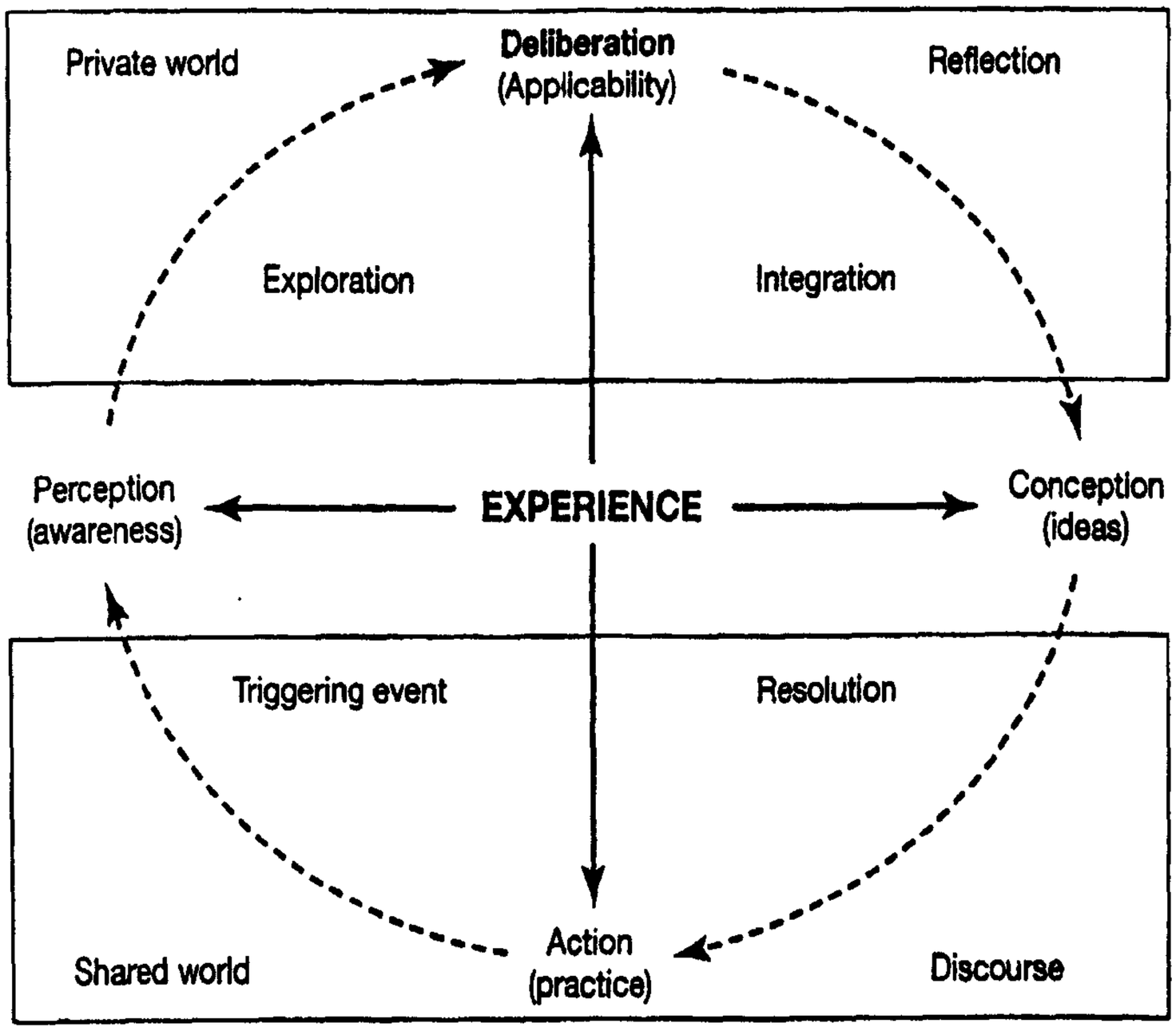


Figure 2.4 Practical Inquiry model (Source: Garrison et al. 2001: 9)

The initiation phase of critical inquiry is a *triggering event*, which is a dilemma or problem identified or recognized from experience. The second phase of the cycle is *exploration*, in which participants "shift between the private, reflective world of the individual and the social exploration of ideas". Participants first grasp the nature of the problem and then explore the relevant information. In a community of inquiry, the process of exploration iteratively moves between the private and shared worlds, or between critical reflection and discourse. Finally, students have to decide what is relevant to the issue or problem. In the third phase, *integration*, students construct meaning from the ideas created in the exploratory phase. Students have to assess the applicability of ideas between the exploratory and integration phase. Students may move repeatedly back and forth from reflection to discourse. The last phase is a *resolution* of the problem initiated in the triggering event. In practice, this is an application of the proposed solution or a test of the hypothesis (Garrison et al 2001).

In their analysis of cognitive presence in online conferencing messages, Garrison et al. (2001) establish a protocol for the four phases, providing descriptors, indicators and socio-cognitive processes for each (Table 2.2). The indicators that follow not only clearly define what cognitive presence comprises, but also provide concrete suggestions on moderating an online conference.

Table 2.2 Practical inquiry descriptors and indicators

Phase	**Descriptor**	**Indicator**	**Sociocognitive Processes**
Triggering event	Evocative (inductive)	Recognize problem	Presenting background information that culminates in a question
		Puzzlement	Asking questions Messages that take discussion in new direction
Exploration	Inquisitive (divergent)	Divergence-within the online community	Unsubstantiated contraction of previous ideas
		Divergence-within a single message	Many different ideas/themes presented in one message
		Information exchange	Personal narratives/descriptions/facts (not used as evidence to support a conclusion)
		Suggestions for consideration	Author explicitly characterizes message as exploration- e.g., "Doest that seem about right?" or "Am I way off the mark?"
		Brainstorming	Adds to established points but does not systematically defend/justify/develop addition
		Intuitive leaps	Offers unsupported opinions
Integration	Tentative (convergent)	Convergence- among group members	Reference to previous message followed by substantiated agreement, e.g., I agree because…" Building on, adding to others' ideas
		Convergence- within a single message	Justified, developed, defensible, yet tentative hypotheses
		Connecting ideas, synthesis	Integrating information from various sources- textbook, articles, personal experience
		Creating solutions	Explicit characterization of message as a solution by participant
Resolution	Committed (deductive)	Vicarious application to real world	None Coded
		Testing solutions	
		Defending solutions	

Source: Garrison, Anderson & Archer (2001:15-16) and Garrison & Anderson (2003: 61)

Garrison et al. (2001) have empirically examined the messages of an online conference, to assess the nature and quality of critical discourse and thinking. Their content analysis study not only verifies the applicability of their practical inquiry model in analyzing online conference messages, but also shows that online conferencing can serve as a medium for critical thinking and collaborative learning.

2.2.4.2 Social presence

Just like most of the online learning researchers mentioned in the previous sections (e.g. Gunawardena & Zittle 1997, Tu 2000), Garrison and his colleagues appreciate the importance of building a cohesive community among the participants. They argue that there must be some degree of social presence in order to create a community, and "social presence becomes more specific and demanding when the community is one of inquiry" (Garrison & Anderson 2003: 49).

Many communication theorists argue that text-based communication, such as online conferencing, does have limitations in building collaborative relationships. For example, Short et al. (1976), after studying a variety of media including fax, voice mail, and audio-conferencing, postulated the limitation of these media to transmit nonverbal cues, and the low social presence of these media produced a negative effect on interpersonal communication. Rourke and Anderson (2002a), however, show in their study that students can overcome the lack of non-verbal communication by establishing familiarity through the use of greeting, encouragement, paralinguistic emphasis (such as bold face-type and use of capital letter), and personal vignettes (emoticon) in their text-based communication. Gunawardena and Zittle (1997) and Tu (2000, 2001) express similar point of view after empirical studies on social presence. In other words, social presence in mediated communication is something that can be cultivated by the participants.

It is worth noticing that the same notion of "social presence" has different conceptualizations among different researchers. In the CoI model, however, social presence is classified into three categories, namely, affective responses, open communication, and cohesive responses (Rourke et al 1999, Garrison & Anderson 2003).

Based on theoretical analysis of the literature, and the analysis and coding of online conferencing messages, a series of indicators for each of the three categories are derived (Table 2.3).

Similar to that of cognitive presence, the indicators for social presence are also functionalities of linguistic features in conference messages, which serve to enhance the degree of social presence.

If social presence is something that can be manipulated, a meaningful question arises: how much social presence do online learners need? Garrison and Anderson (2003) suggest that there is an "optimal level" of social presence. "Too little social presence may not sustain the community", while too much may "inhibit disagreement and encourage surface comments and social banter" (Garrison & Anderson 2003:53).

Table 2.3 Social presence classification and indicators

Category	Indicators	Definition	Examples
Affective responses	Expression of emotion	Conventional expressions of emotion, or unconventional expressions of emotion, includes repetitious punctuation, conspicuous capitalization, emoticons	"I just can't stand it when …!!!!" "ANYBODY OUT THERE!"
	Use of humour	Teasing, cajoling, irony, understatement, sarcasm	The banana crop in Calgary is looking good this year ;-)
	Self-disclosure	Presents details of life outside of class, or expresses vulnerability	"Where I work, this is what we do…" I just don't understand this question"
Open communication	Continuing a thread	Using reply feature of software, rather than starting a new thread	Software dependent, e.g., "Subject: Re" or "Branch from"
	Quoting from others' messages	Using software feature to quote others' entire message or cutting and pasting selections of others' messages	Software dependent, e.g., "Martha writes:" or text prefaced by less than symbol<
	Referring explicitly to others' messages	Direct references to contents of others' posts	"In your message, you talked about Moore's distinction between…"
	Asking questions	Students ask questions of other students or the moderator	"Anyone else had experience with WEBCT?"
	Complimenting expressing appreciation	Complimenting others or contents of others' messages	"I really like your interpretation of the reading"
	Expressing agreement	Expressing agreement with others or contents of others' messages	"I was thinking the same thing. You really hit the nail on the head"
Cohesive responses	Vocatives	Addressing or referring to participants by name	"I think John made a good point." "John, what do you think?"
	Addresses or refers to the group using inclusive pronouns	Addresses the group as we, us, our, group	"Our textbook refers to …", "I think we veered off track…"
	Phatics, salutations	Communication that serves a purely social function; greetings, closures	"Hi, all," "That's it for now" "We're having the most beautiful weather here"

Source: Adapted from Garrison & Anderson (2003:51)

2.2.4.3 Teaching presence

Besides social presence, teaching presence is another important element which enhances cognitive presence, i.e., critical thinking and knowledge construction, in a community of inquiry. According to Garrison and Anderson (2003), teaching presence is "the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcome". Teaching presence is "what the teacher does to create a community of inquiry that includes both cognitive and social presence" (p.66). The interrelationship between social, cognitive, and teaching presences is, obviously, neither straight forward nor linear, so it is worth clarifying the relationships between them.

When establishing the categories of teaching presence, Anderson et al. (2001) propose three teaching roles in the context of mediated communication, namely, instructional design and organization, facilitating discourse, and direct instruction (see Table 2.4). The three roles of an online tutor described by Anderson et al. (2001) can be compared with those proposed by Mason (1991b), who proposes three major roles of a moderator, i.e., organizational role, social role, and intellectual role. Berge (1995) also suggests similar roles of an online instructor, i.e., pedagogical role, social role, managerial role, and technical role.

Garrison and Anderson (2003) assert that these categories are based on the online conference messages analyzed, and the categorization is remarkably consistent with other similar classifications of teaching roles in online learning (compare Anderson et al. 2001 with Mason 1991a, Berge 1995, Paulsen 1995).

Table 2.4 Teaching presence and classification

Category	Indicators	Examples
Instructional design and organization	Setting curriculum	"This week we will be discussing. . ."
	Designing methods	"I am going to divide you into groups, and you will debate. . ."
	Establishing time parameters	"Please post a message by Friday. . ."
	Utilizing medium effectively	"Try to address issues that others have raised when you post"
	Establishing netiquette	"Keep your messages short"
	Making macro-level comments about course content	"This discussion is intended to give you a broad set of tools/skills which you will be able to use in deciding when and how to use different research techniques"
Facilitating discourse	Identifying areas of agreement/disagreement	"Joe, Mary has provided a compelling counter-example to your hypothesis. Would you care to respond?"
	Seeking to reach consensus/ understanding	"I think Joe and Mary are saying essentially the same thing"
	Encouraging, acknowledging, or reinforcing student contributions	"Thank you for your insightful comments"
	Setting climate for learning	"Don't feel self-conscious about 'thinking out loud' on the forum. This is a place to try out ideas after all."
	Drawing in participants, prompting discussion	"Any thoughts on this issue?"; "Anyone care to comment?"
	Assessing the efficacy of the process	"I think we're getting a little off track here"
Direct instruction	Present content/ questions	"Bates says…what do you think"
	Focus the discussion on specific issues	"I think that's a dead end. I would ask you to consider…"
	Summarize the discussion	"The original question was …Joe said…Mary said…we concluded that…We still haven't addressed…"
	Confirm understanding through assessment and explanatory feedback	"You're close, but you didn't account for… this is important because…"
	Diagnose misconception	"Remember, Bates is speaking from an administrative perspective, so be careful when you say…"
	Inject knowledge from diverse sources, e.g., textbook, articles, Internet, personal experiences (includes pointers to resources)	"I was at a conference with Bates once, and he said…You can find the proceedings from the conference at http://www…."
	Responding to technical concerns	"If you want to include a hyperlink in your message, you have to . . ."

Source: Adaptation from Garrison & Anderson (2003: 68, 70-71)

2.2.4.4 Research methodology

In developing their CoI model, Garrison and his colleagues have been using quantitative content analysis as the major research methodology (Rourke et al. 2001a; Anderson et al. 2001; Garrison et al. 2000, 2001). Most of the subsequent studies adopting the same model follow the practice and adopt content analysis.

Quantitative content analysis is "a research technique for the objective, systematic, quantitative description of the manifest content of communication" (Berelson 1952: 519). A similar definition by Holsti (1969) is "any technique for making inferences by objectively and systematically identifying specified characteristics of messages" (p. 14). The analysis begins with a construct to be examined, and it comes usually from a model or theory of interest. A coding scheme or protocol for identifying and categorizing the target variables is then constructed. Trained raters then analyze the conference messages in a representative sample with the scheme, and the frequency of the occurrence of the indicators in the coding scheme is recorded. Researchers can therefore have a full description of the target variables, in the form of a frequency table, and relationships between variables, if any, can be identified (Weber 1990). Corich, Kinshuk & Hunt (2004), after a review of literature, report that content analysis is the most popular approach used by researchers to evaluate quality in conference messages. Rourke et al (2001) also admit that the automatically recorded and machine-readable data generated by online conferences is "a compelling source of data for educational researchers" (p. 9).

The criteria of a good content analysis study, as suggested by Rourke et al. (2001b), are objectivity, reliability, replicability, and systematic coherence. The objectiveness refers to the extent to which categorization of sections of transcripts is subject to influence by the raters, and it is reflected by the inter-rater reliability. The replicability of a coding

scheme or protocol in a content analysis study, in Rourke et al.'s (2001) words, is the "ability of multiple and distinct groups of researchers to apply a coding scheme reliably" . A systematic content analysis is that having a well-structured set of ideas, assumption and concepts, which serves to structure the data. The coding schemes of the various presences in the CoI model, as shown in the previous sections, have been practically adapted and replicated in many content-analysis studies (e.g., Meyer 2003; McKlin et al. 2001; Pawan et al. 2003; Shea et al. 2003; Choi et al. 2004). The coding schemes of the CoI model for content analysis are considered to be rather mature, and issues of reliability and validity have also been carefully examined (Rourke et al. 2001a; Garrison & Anderson 2003, Rourke & Anderson 2004; Garrison, Cleveland-Innes, Koole & Kappelman 2006).

One of the important criteria for an objective and reliable content analysis is the inter-rater reliability, which is defined as the agreement among raters about the categorization of content (Bullen 1998). There are two common tools of calculating the inter-rater reliability of a content analysis study, i.e., Holsti's (1969) coefficient of reliability (C.R.) and Cohen's kappa (*k*).

The formula of the C.R. is shown below:

$$C.R. = \frac{2m}{n_1 + n_2}$$

where: m = the number of coding decisions upon which the two coders agree;

n_1 = number of coding decisions made by the first rater;

n_2 = number of coding decisions made by the second rater.

Riffe, Lacy and Fico (1998) suggest that a C.R. of 0.8 is usually the standard for communication research.

Cohen's kappa (k) is a chance-corrected measure of inter-rater reliability, and thus a more conservative measure when compared with C.R.. Cohen's kappa assumes 2 raters, n cases, and m mutually exclusive and exhaustive nominal categories (Capozzoli, McSweeney & Sinha 1999). The formula for kappa is:

$$k = \frac{F_o - F_c}{N - F_c}$$

Where: N = the total number of judgements made by each rater;

F_o = the number of judgements on which the raters agree;

F_c = the number of judgements for which agreement is expected by chance.

Capozzoli et al. (1999) suggest that kappa below 0.40 represent poor agreement beyond chance, and a value greater than 0.75 represent excellent agreement.

In the earlier content-analysis studies, the inter-rater reliabilities of all the three content coding schemes were found to be acceptable (Garrison et al. 2001, Rourke et al. 2001a, Anderson et al. 2001). For the coding scheme of cognitive presence, the C.R. is 0.84 and kappa is 0.74 (Garrison et al 2001). For social presence, the C.R. is as high as 0.95 (Rourke et al 1999). For teaching presence, the reported kappa is 0.84 (Anderson et al. 2001).

In order to establish the validity of a coding scheme or protocol of content-analysis, techniques such as correlational analysis, examination of group differences, and experimental intervention have been suggested (Messick 1989). There have not been studies of these kinds directly and explicitly validating the coding schemes of the CoI model. Garrison, Cleveland-Innes and Fung (2004), nevertheless, designed a questionnaire to assess students' role adjustment in online learning, applying the CoI model. The instrument was constructed from the indicators of each of the three presences of CoI model, and the 28-item questionnaire was sent to students from an

online learning course and a face-to-face class. Exploratory factor analysis of the data from an online course reveals that the factor structure corresponds well to the theoretical constructs of the three presences, though not all items loaded as predicted (Garrison et al. 2004). The validity of the three theoretical constructs is therefore justified.

Although Rourke et al. (2001b) suggest that the research approach of content analysis can be used for descriptive as well as experimental design which involves influential hypothesis testing, most of the previous studies were descriptive by their nature and involved only one single course. This can be explained by the fact that content analysis study is "difficult, frustrating and time-consuming" (Rourke et al 2001b: 9). In order to make generalizable findings with an experimental design, there must be an adequate sample of courses to be analyzed, and this makes the task very labour-intensive.

Another limitation of content analysis studies on the CoI model is that the interrelationship of the three elements of the CoI model cannot be easily revealed. In fact, previous researches on CoI paid little attention to the relationship between the 3 components. Garrison et al. (2000) claim that teaching presence support and enhance both social and cognitive presences, while social presence supports cognitive presence. However, the claims have not been much investigated or by any means validated. In fact, simply by content analysis of conference messages, the interrelationship of the 3 presences cannot be meaningfully explored. It is because the units of analysis in the established coding schemes regarding different presences are different, and so the data collected for various presences cannot be compared directly.

The following table is a summary of the methodology of the content analysis studies by Garrison and his colleagues.

Table 2.5 Methodology of the content-analysis studies of CoI

	Cognitive presence	Social presence	Teaching presence
Content analysis study	Garrison et al. (2000)	Rourke et al. (2001a)	Anderson et al. (2001)
Coding scheme and indicators	See Table 2.2	See Table 2.3	See Table 2.4
Unit of analysis	message	thematic unit	message

Garrison et al. (2000) and Anderson et al. (2001) both adopt a message-level unit of analysis in their studies on cognitive and teaching presences, while Rourke et al. (2001a) take a thematic unit instead. In fact, though Garrison et al. and Anderson et al. both take message as a unit of analysis, there are differences in their actual coding practice. A unit of analysis, according to Krippendorf (1980), is a discrete element of text that is observed, recorded, and thereafter considered data in content analysis. The selection of unit of analysis, like inter-rater reliability, is always an important issue in a content-analysis study (Rourke et al. 2001b).

Garrison et al (2000) define a message-level unit as "what one participant posted into one thread of the conference on one occasion" (p. 16), and each message can be counted once among the four phases of cognitive presence. When there are contradictory categorization or multiple phrases of cognitive presence in one message, the message will still be identified as one single unit. Raters simply take the earlier phase (code down) if it is not clear which phases the message is reflecting, and take the later phase (code up) when multiple phases are present (Garrison et al 2001). The code-up and code-down strategies, therefore, eliminate the possibility of multi-phase coding in a message.

When analyzing the teaching presence in conference messages, however, unlike the study of cognitive presence, Anderson et al (2001) do not simply assign a message with teaching presence to one and only one of the categories of teaching presence, but they allow a single message to reflect characteristics of more than one category. Therefore, a message posted by an instructor can exhibit more than one indicator of the 3 categories of teaching presence.

The advantages of using message unit over thematic unit are that the coding process is less time-consuming and inter-rater reliability can be enhanced (Anderson et al 2001, Rourke et al 2001). However, in the analysis of social presence, Rourke et al (1999) adopt the thematic unit, which is defined as "a single thought unit or idea unit that conveys a single item of information extracted from a segment of content" (Budd et al 1967: 34), together with "the reliable identification attributes of a syntactic unit", such as "addressing or referring to participants by name" and "addressing the group as *we, us, our group*" (Rourke et al 1999).

Since the coding practices for different presences are different in those studies conducted by Garrison and his research team, the variables of different presences collected from the content analyses cannot be directly compared, and the relationship between the core elements of CoI model cannot be revealed.

In fact, the present researcher suspects that even though there is adequate labour to conduct content analysis of a large number of courses, the frequencies collected for a number of courses may not appropriately represent the presence concerned. For instance, in the view of a learner participating in two online courses, the same number of frequencies coded for teaching presence in the two courses may not reflect the same teaching presence perceived. Tutors in different courses may post an equal number of messages with identical frequencies of different features of teaching presence, but the

instructional skills presented may still be differentiated.

The perceptions of the presences by learners may be more important than the frequencies recorded in the content analysis. Students' perceptions of online learning have long been an issue concerned by researchers (O'Mally & McCraw 1999, Peters 2001, Schönwetter & Francis 2003), but only a couple of previous studies of CoI model involve perceptions of social presence and teaching presence, i.e., Rourke and Anderson (2002a, 2002b)

Rourke and Anderson (2002a) explore the relationship between the frequency of social expressions and social presence in a text-based asynchronous communication. Social presence in this study is measured by a semantic differential scale on which students were asked to rate on 6 bipolar adjectives, i.e., warm-cold, personal-impersonal, friendly-unfriendly, trusting-untrusting, disinhibiting-inhibiting, and close-distant. The data show that students with higher perceived social presence have more frequent social expressions in their messages. However, the 6-item semantic differential scale used to measure social presence in Rourke and Anderson (2002a) are incomparable to the content analysis study by Rourke et al. (2001a), in which 12 indicators of social presence are classified into three categories, i.e., affective responses, open communication and cohesive responses (see Table 2.3). In fact, Rourke and Anderson (2002b) have no intention to use the semantic differential scale to represent the social presence reflected in the conference messages. The semantic differential scale used in Rourke and Anderson (2002a), therefore, can be seen as an alternative approach of defining social presence, but does not represent the social presence in the CoI model in Garrison and Anderson (2003).

Rourke and Anderson (2002b) investigate how well students perform in leading an online discussion. Learners were asked to evaluate student-leaders' ability to perform

the teaching presence roles by rating 10 Likert items, which corresponded to the coding scheme of teaching presence in Anderson et al. (2001). With the supplement of content analysis and interview, Rourke and Anderson (2002b) report that in their particular study, students prefer peer teams to the instructor as discussion leaders.

The two studies mentioned above adopt questionnaire items to measure perceived social presence and teaching presence, and the results were quantitatively analyzed. However, there was no empirical study investigating how each of the three presences, whether revealed by content analysis or perceived by learners themselves, affect students' participation, attainment and satisfaction towards online conferencing, not to say CoI model as a whole.

To fill the gap, the present study is designed to examine students' perceptions of the various presences and their effect on students' performance and satisfaction. The findings may help working towards a better understanding of theory.

2.3 Factors influencing students' performance and satisfaction in online conferencing

In the present study, it is assumed that students' participation in, and satisfaction towards online conferencing as a channel of communication and learning, as well as their perceived attainment are important indicators of student success in online learning. So they are chosen to serve as dependent variables in the study. In fact, a number of similar studies on online learning adopt these variables as the key indicators (e.g. Shin & Chan 2004, Eom et al. 2005).

Previous researches on these indicators in online learning are ample, but most of them focused on one or two factors that affect learners' satisfaction and performance, without addressing systematically the pedagogical environment of online conferencing. The following sections will provide a review *the previous studies.*

2.3.1 Factors affecting students' participation

As CMC becomes an essential component in online learning, and interaction is such a crucial criterion for effective learning, more and more online educators focus on students' actual participation in the online communication (e.g., Fung 2000, Lim 2001, Tsang et al. 2002, Taylor 2002). While acknowledging the benefit and capacity of learners' exchange in an online community, researchers also notice the problem associated with lack of attention and participation. Mason and Hart (1997) argue that a virtual community may not "work" properly as a learning environment if the majority of users fail to participate actively. In a small-scale empirical study comparing completion rate and GPA (grade point average) of students with different degrees of participation in online conference, Taylor (2002) finds that the *workers* (proactive participants who read and contribute regularly) and *lurkers* (regular participants who read the messages frequently but do not post any messages) outperform the *shirkers* (inactive participants in online conference) significantly. The GPA of workers and lurkers are 5.43 and 5.41 respectively while that of the shirkers is only 4.3. There are 7 of the 12 shirkers who fail to complete the assessment. Taylor (2002) concludes that "students who have a more parsimonious approach [i.e., the shirkers] to engagement are at risk of failure". Although the single case study with small sample (n=43) may not give generalizable findings, the relationship between participation and attainment is worth further examination.

The participation of online discussion or conferencing has long been a matter of concern and there are a number of studies concerning the factors affecting students' participation in online discussion or CMC. Having reviewed a number of recent studies on this topic, factors affecting students' participation can broadly be classified into four categories:

Students' characteristics

In a study regarding secondary students in schools, Fishman (1999) reveals that students with better skills and experience with computers participate more actively in online discussion. Students with prior experience in online learning are also found to have higher participation in CMC (Vrasidas & McIsaac 1999, Volery & Lord 2000, and Tolmie & Boyle 2000).

Teachers' characteristics

Teachers' characteristics are also considered to be related to students' participation in CMC. Vrasidas (1999) argues that teachers' philosophy is an influential factor towards students' participation. Volery and Lord (2000) make it more explicit, saying that it is teachers' attitude towards students that matters. They find that teachers' technical competence and their ability to encourage students to interact also help. The studies reveal that an instructor's own participation in online discussion must have considerable effect on their students'. Vrasidas and McIsaac (1999) highlight one of the key variables in promoting students' participation, i.e. feedback. Their qualitative study reveals that students are quite anxious about feedback from their teachers. A study on the use of online conference in the OUHK reports that tutors' participation, in terms of the number of messages posted, is positively correlated with students' participation. Correlation coefficients between tutors' number of messages posted and students' logins and number of messages posted are 0.762 and 0.782 respectively, at a 0.01level (Tsang et al. 2002).

Online learning platform/ medium

Another important factor that determines students' participation is the online learning system itself or the medium via which communication takes place (Vrasidas 1999, Tolmie & Boyle 2000, and McAteer, Tolmie & Duffy 1997). Volery and Lord (2000)

suggest that factors such as ease of use and the design of system interface may also influence the participation of online communication.

Pedagogical arrangement

In different online learning courses, the role of CMC can be very different. In some courses, CMC is a core component in the learning activities, and students' participation in online discussion will even contribute to their final grade. Students taking such courses regularly have to spend a considerable amount of time in CMC. At the other extreme is a system where students are simply provided with the channel for communication, and their participation is entirely on a voluntary basis. Tolmie and Boyle (2000) suggest that students will become more actively involved in the CMC if there is a clear purpose for the communication or interaction, especially when there are no other more convenient alternatives. So it is revealed that in those courses where CMC is a "requirement", students will participate in the online interaction more actively. This may then explain why students in the OUHK do not participate actively in the online discussion.

Content of instruction is also believed to be an important factor that determines students' participation while discussion and sharing of experience are considered to be more important in courses of certain subjects or disciplines (Vrasidas 1999). It reflects that students will involve themselves in a CMC when they find it useful to their learning.

Class size is another factor that affects students' participation in CMC. Vrasidas and McIsaac (1999) argue that students' participation in a bigger class will be more frequent because student's messages will have a bigger chance to be responded to. Tolmie and Boyle (2000), however, have quite the opposite point of view. They believe that when the class size is smaller, students will have a better knowledge of each other

and will have a better participation in CMC. The effect of class size on students' involvement in CMC, therefore, needs further study.

Social presence

Although social presence is found to be a significant factor influencing students' satisfaction in online conferencing, as shown in the next section, different studies reveal that social presence has no significant impact on students' participation in the online discussion (Tu 2000, Swan & Shih 2005).

A number of factors affecting students' participation in online conferences are revealed but most of the studies mentioned above did not further differentiate the two basic concepts of "participation". As suggested by Taylor (2002), there are two types of active participants, i.e., the workers and lurkers. The former reads and posts messages regularly in the conference, and the later serves mainly as a regular reader. Therefore, participation in conferences can be further classified into productive and receptive participation. Productive participation involves posting messages in conference, and receptive participation simply reading the messages. Factors affecting the two different types of participation, therefore, may still need further investigation.

2.3.2 Factors affecting students' satisfaction

Student's satisfaction towards online learning has also been extensively studied (e.g., Gunawardena & Zittle 1997; DeBourgh 1999; Gunawardena & Duphorne 2000, 2001; Arbaugh 2000b, 2001; Lim 2001; Swan 2001; Richardson & Swan 2003; Eom et al. 2005). Similar to participation studies mentioned above, most of the empirical studies on students' satisfaction focused on the various factors that affect level of satisfaction. To serve the purpose of the present study, the following review focuses only on students' satisfaction towards their experience in online conferencing.

Fulford and Zhang (1999) argue that interaction between learners and their teachers is correlated with both satisfaction and achievement in online learning situation. The relationship between interaction and satisfaction is confirmed by a number of other studies. Debourgh (1999) highlights the importance of learner-instructor interaction, and argues that instructor's promptness of responses and the extent to which the instructor encourages class participation greatly affect students' satisfaction. Similarly, Swan (2001) also agrees that a dynamic discussion (interaction), and an instructor who interacts frequently and constructively with students are factors contributing to students' satisfaction. Jiang and Ting (1999) make it even more explicit by saying that the amount of learner-instructor interaction directly affects students' satisfaction.

In a small-scale quantitative study, Essex and Gagiltay (2001) try to identify the factors of online distress. They found that students become most dissatisfied when there is a lack of instructor feedback, technical problems in the learning platform, or ambiguous instruction. A similar small-scale qualitative study was conducted by Hara and Kling (2000) and they reported 5 causes of student distress in online learning, namely, feeling of social isolation, overwhelming e-mail communication, lack of instructor feedback, technical problems, and ambiguous instruction. Besides the three factors identical to the study by Essex and Gagiltay (2001), students are not satisfied when they feel isolated. On the other hand, students are also dissatisfied when they get overwhelming numbers of e-mails.

Gunawardena and Zittle (1997) suggest that the degree of social presence is one of the determining factors of students' satisfaction, which accounted for 60% of the variance when measuring students' satisfaction. For the concept of social presence, Gunawardena and Zittle refer to the degree to which a person is perceived as "real" in mediated communication such as in an online discussion group. Tu (2000), Richardson and Swan (2003) and Swan and Shih (2005) all review by empirical studies that

students with high overall perceptions of social presence also score high in satisfaction.

Besides learner-instructor interaction, Palloff and Pratt (2001) suggest learner-interface interaction is also an important factor to student satisfaction in online courses. Thomerson & Smith (1996) state that technical aspects were the most frequent cause of course deficiencies, student anxiety and frustration, negative attitudes towards the course, and student's dissatisfaction. Lim (2001) finds that students with high computer self-efficacy are more likely to be satisfied with their online learning, and they are more willing to take online courses in the future.

Shin and Chan (2004) introduce a concept "institutional presence", which is defined "as the degree to which a distance student perceives the availability of support services in the institution while feeling connected to it"(p.279). In an empirical study in the OUHK, Shin and Chan (2004) find that institutional presence also significantly correlates to student satisfaction level ($r = 0.634$, $p < 0.01$, n=285).

2.3.3 Factors affecting students' attainment

To evaluate students' attainment through online conference, the present study adopts students' perceived attainment or learning outcome as the indicator, rather than their academic achievements in terms of examinations or assignments. The convenience of this measure may be one of the factors making it a common dependent variable in many studies in online education (e.g., Alavi 1994, Jiang & Ting 2000, Swan 2001, Graham & Scarbough 2001, Shin & Chan 2004, Rom et al. 2005). Moreover, experience in online conference is only one factor among many others affecting students' actual academic achievement. Phipps and Merisotis (2000), for example, have identified a total of 7 categories of 24 benchmarks for a success in online education. The actual effect of learning through online conferencing could hardly be singled out and measured.

In reviewing a number of researches on web-based instruction, Eom et al. (2005) conclude that learner-instructor interaction and instructor feedback have a strong positive relationship to students' perceived learning outcome. However, the nature of the learner-instructor interaction or instructor feedback has not been fully explored. Students' characteristics are also important factors determining their perceived learning outcomes. Students with higher self-motivation and spending more time on the online course materials or online conferencing also perceive a higher attainment through their online experience (Graham & Scarbough 2001).

Though there has been little research on the relationship between students' personality or learning style with perceived learning outcomes in online learning, a couple of studies show that there may be a weak relationship between them (Graham & Scarbough 2001, Swan 2001). However, a quantitative study by Eom et al. (2005) does not provide empirical support to the speculation.

Although the effect of social presence in online conferencing has been widely explored in previous studies, none of them relate directly to learners' attainment or learning outcomes. The only study regarding the notion of presence and attainment is by Shin and Chan (2004), who conclude in their study that the construct of institutional presence significantly correlates to perceived learning outcomes ($r = 0.403$, $p < 0.01$, n=285).

Among the studies concerning students' attainment in online learning, most of them focus on factors other than learning through online conferencing. The quantity of learner-instructor interaction is the only factor revealed to be positively related to students' perceived attainment. The nature and quality of the interaction, however, have not been systematically investigated.

2.3.4 Conclusion

It has been shown that there are plenty of studies investigating students' participation, satisfaction, and attainment in online learning, but most of the factors revealed, such as learner's characteristics, pedagogical arrangement and self-motivation, do not relate directly to learners' experience in online conferencing. The only relevant and recurring factors reviewed in the previous sections are social presence and learner-instructor interaction. As the use of online conferencing in online learning is getting more popular, in both distance education and on the traditional campus, an investigation of factors determining the efficiency of online conference as a learning and communication tools becomes valuable.

The CoI model proposes a framework encompassing the major elements of learning through online conferencing, but its strength and effect on students' learning is an area that has been little explored. Therefore the present study, which examines the relationship between various presences in online conferences and students' participation, attainment and satisfaction, could provide practical insights for online instructors and instructional designers, who are practically leading an online conference, and working to enhance students' learning through the communication tool.

Chapter 3 - Research design and methodology

3.1 Introduction

In order to examine the exploratory power of the "Community of Inquiry" model, the major task would be to define and measure the three major components, namely, social presence, cognitive presence and teaching presence. In most of the previous studies regarding CoI model on online conferencing, including those pioneering studies conducted by Garrison and his colleagues (Rourke et al 2001a, Garrison et al. 2001, Anderson et al. 2001) and many others (e.g., McKlin et al. 2001, Meyer 2003, Pawan et al. 2003, Choi et al. 2004), quantitative content analysis is the major methodology employed.

However, even Garrison and his research team acknowledge that content analysis study is "difficult, frustrating and time-consuming" (Rourke et al. 2001b: 9) and it is probably one of the reasons why most of the previous content analysis studies involved only a comparatively small cohort of learners in one particular course (for example, Garrison et al. 2000, Meyer 2003, Rourke et al. 2001a, Anderson et al 2001). The major drawback of this particular technique in studying the online conference is that the same cohort of learners of a particular course is quite homogenous, regarding their background, and they are under the same tutorial support. Therefore, by merely analyzing the content of a particular course, it is not possible to make a sensible generalization of the findings. Furthermore, since the messages in an online conference are shared among the whole group of learners, the various presences revealed by content analysis in a particular conference illustrate nothing more than a single case.

In order to make sensible generalization on the explanatory power of the CoI model, a comparatively larger sample of students from many different courses has to be included in the present study. However, owing to limited resources for the present

study, content analysis of dozens of courses is considered not to be very feasible. Moreover, owing to the different coding practices and units of analysis regarding different presences, quantitative comparison of their effect on learning is not plausible. So the present researcher decided to use the method of survey instead of content analysis. According to Creswell (2005: 354), survey research designs are "procedures in quantitative research in which investigations administers a survey to a sample or to the entire population of people in order to describe the attitudes, opinions, behaviours, or characteristics of the population". Therefore, it is favourable for collecting data from a wide population and enables generalizations of finding (Cohen & Manion 1994).

In the present study, a questionnaire was developed to measure the various presences in the CoI model. The presences examined by means of a questionnaire, however, are not identical to the presences measured by Garrison and his colleagues by content analyses. To be exact, the "presences" reviewed by the questionnaire are those perceived by the respondents, after some experience in online conferences. The perceived presences of students can then be analyzed together with students' satisfaction towards and performance, i.e., participation and attainment, in online conferences.

A more detailed description of the methodology in the present study, including the reliability and validity of the instrument used, is presented in the following sections.

3.2 Research questions and hypotheses

As it is stated in chapter one, the present study was designed to investigate the use of and students' perceptions of online conference in the OUHK, the explanatory power of CoI model on learners' performance and satisfaction, as well as the interrelationship between the three presences. The three research questions in chapter one are repeated below:

1. How is the online conference used and perceived as a learning tool of distance learning courses among students in the OUHK?

2. Can the "Community of Inquiry" model, in which the three types of "presences" are independent variables, help us to understand students' performance and satisfaction in online conference?

3. What are the statistical correlations between teaching presence, cognitive presence and social presence in the "Community of Inquiry" model?

As mentioned in the previous section, perceived presences measured by questionnaire instead of those reflected in conference messages are the concern in the present study, research questions 2 and 3 are therefore modified accordingly. The revised research questions are:

1. How is the online conference used and perceived as a learning tool of distance learning courses among students in the OUHK?

2. Can the "Community of Inquiry" model, in which the three types of "presence" perceived are independent variables, help us to understand students' participation, perceived attainment, and satisfaction in online conference?

3. What are the statistical correlations between students' perceptions of teaching, cognitive and social presences in the "Community of Inquiry" model?

An online cross-sectional survey design was employed for the study, and data collected were used to answer the research questions.

For research question 1, descriptive analysis was used to explore students' participation, perceived attainment and satisfaction in online conferencing. Students' perceptions of various presences in the online conferencing were also reported. As there were 4 Schools in the OUHK, and they were all utilizing online conference as teaching and

learning support, the present study was also designed to explore if online conference was equally helpful to students in different Schools. Comparisons of students' participation in, and satisfaction and perceived attainment on the use of online conference were conducted. Students' perceptions of various presences in the conferencing from different Schools were also compared. The following hypotheses were then tested:

H_1: Students taking courses from different Schools in the OUHK have different level of perceived cognitive presence in online conference.

H_2: Students taking courses from different Schools in the OUHK have different level of perceived social presence in online conference.

H_3: Students taking courses from different Schools in the OUHK have different level of perceived teaching presence in online conference.

H_4: Students taking courses from different Schools in the OUHK have different level of participation in online conference.

H_5: Students taking courses from different Schools in the OUHK have different level of satisfaction in the use of online conference.

H_6: Students taking courses from different Schools in the OUHK have different level of perceived attainment in the use of online conference.

For research question 2, the focus is the relation between various perceived presences and students' participation, perceived attainment, and satisfaction. Hypotheses 7-15 were therefore formulated. For exploring the explanatory power of the CoI model as a whole on various dependent variables, hypotheses 16-18 were tested.

H_7: Students reporting higher perceived teaching presence will have higher participation in online conference.

H_8: Students reporting higher perceived teaching presence will have higher perceived attainment through online conference.

H_9: Students reporting higher perceived teaching presence will have higher satisfaction towards online conference as a learning tool.

H_{10}: Students reporting higher perceived social presence will have higher participation

in online conference.

H_{11}: Students reporting higher perceived social presence will have higher perceived attainment through online conference.

H_{12}: Students reporting higher perceived social presence will have higher satisfaction towards online conference as a learning tool.

H_{13}: Students reporting higher perceived cognitive presence will have higher participation in online conference.

H_{14}: Students reporting higher perceived cognitive presence will have higher perceived attainment through online conference.

H_{15}: Students reporting higher perceived cognitive presence will have higher satisfaction towards online conference as a learning tool.

H_{16} The three perceived presences of CoI model are significant predictors of students' satisfaction towards online conferencing.

H_{17} The three perceived presences of CoI model are significant predictors of students' perceived attainment through online conferencing.

H_{18} The three perceived presences of CoI model are significant predictors of students' participation in online conferencing.

The last research question concerns the relationship between various perceived presences, and the corresponding hypothesis is stated below.

H_{19}: There are significant correlations among students' perceptions of teaching, social and cognitive presences.

3.3 Design and procedures

The questionnaire developed to measure the various presences is a vital component of the present study. In order to make sure that the instrument constructed is valid and reliable, a pilot study was conducted to examine these factors. Thus, the present study was divided into the following two parts:

i. Pilot study: The pilot study was to develop and validate a questionnaire of perceived cognitive, social, and teaching presences on online conference;

ii. Main study: With the validated questionnaire, the main study was to explore the relationship between various presences in the CoI model and students' satisfaction, participation, and perceived attainment, as well as the interrelationship between the three presences perceived.

The detailed procedures and relevant instruments in each part are described in the following sections.

3.3.1 Pilot study

The first part of the study is a pilot study, which consists of a student survey and a number of content analyses.

The questionnaire used in this survey was designed to measure students' perceptions of different presences in online conferences, as well as their satisfaction and perceived attainment in the use of online conference. The content analysis revealed the frequencies of the various presences in the courses concerned, and the result could be used to validate the scales of various perceived presences.

3.3.1.1 Design of questionnaire

The questionnaire for the main survey consists of the following 5 sections:

i. Biographical information: Respondents' general background and experience on online learning are collected.

ii. Perceived social, cognitive, and teaching presences: Items measuring various perceived presences in the questionnaire were constructed on the basis of the coding schemes for CoI (Garrison & Anderson 2003).

Based upon the protocols developed by Garrison and his colleagues (see Table 2.2, 2.3, and 2.4), a preliminary questionnaire for various perceived presences, i.e.,

cognitive, social and teaching presences, was developed. All the items in the questionnaire were translated from the indicators of various presences, in order to ensure the content validity of the instrument. As reviewed in the previous chapter, there are different conceptualizations of social presence, but the one suggested by Garrison et al. (2000) was adopted since the CoI model is the focus of the present study. A total of 44 items were derived to measure the three perceived presences in the CoI model, 13 for cognitive presence, 12 for social presence, and 19 for teaching presence. The indicators of the various presences and the corresponding items in the final questionnaire are listed in Appendix 1. All the items are in the form of a 5-point Likert scale, and respondents were asked to report the frequency of the occurrence of the instances described in the items in their own experience of online conference. A "1" indicates "never", and a "5" indicates it occurs "frequently".

iii. Students' satisfaction with online conference: The focus is put solely on students' perceptions of the use of online conferencing on the specific course concerned. The five 5-point Likert items in the main questionnaire were transformed from the "general satisfaction" items in the questionnaire by Strachota (2003) on students' satisfaction with online courses in general. There were minor modifications to suit the focus of the present study, i.e., online conferencing. The Cronbach's alpha reported in Strachota's study was 0.90, and the tool was therefore considered reliable.

iv. Student perceived attainment: Student perceived attainment is defined as the perceived learning outcome from online conference. Items for students' perceptions of their attainment in the main survey were drawn from Shin and Chan's (2004) instrument for effects of online learning. The Cronbach's alpha reported in Shin and Chan (2004) was 0.893. In order to cope with the focus of the

present study, i.e., the use of online conference, 3 items out of 10 from Shin and Chan (2004) were deleted and the others were slightly modified. The deleted items were about the practicality of knowledge in workplace and time management skills.

v. Other opinions on the use of online conference: In the main survey, there is an open-ended question, in which respondents could freely express their views, concerns, and suggestions towards the tool of communication. However, as the main purpose of the pilot study was to establish validity and reliability of the instrument, the open-ended question was omitted in the pilot survey.

The questionnaire for the main survey consists of 62 items and they are summarized in the following table.

Table 3.1 The structure of the questionnaire

Sections		**Number of items**
A. Background		6
B. Perceptions of presences:	Cognitive presence	13
	Social presence	12
	Teaching presence	19
C. Satisfaction on online conference		5
D. Perceived attainment through online conference		6
E. Open-ended question*		1
	Total	62

* The open-ended question appeared only in the main survey.

The questionnaire was then reviewed by 3 instructional designers in the OUHK, all of whom are colleagues of the present researcher, having some knowledge of the CoI model and practical experience in online conferencing. The items in the questionnaire were revised according to their comments and suggestions. The revised questionnaire

was then reviewed and endorsed by supervisors of the present researcher.

Since the questionnaire was designed for students in the Open University of Hong Kong (OUHK) where courses are presented in either English or Chinese, the same questionnaire was translated into Chinese to facilitate those respondents who might not be comfortable in answering a questionnaire in English. The Chinese version of the questionnaire was also reviewed and edited by two editors in the OUHK who had ample experience in translating English to Chinese. The preliminary questionnaire in both languages was then delivered to students in 4 courses through the OLE (Open Learning Environment) of the OUHK (See Appendix 2 for the English and Chinese versions of the final questionnaires).

3.3.1.2 Administration of the survey in the pilot study

This section will present the sampling and the data collection procedure of the survey in the pilot study.

Sample

Subjects of the pilot study were all students in the OUHK, who were taking an undergraduate or postgraduate distance-learning course with online support. There are 4 schools in the OUHK, i.e., School of Arts and Social Sciences (A&SS), School of Education and Languages (E&L), School of Science and Technologies (S&T), and School of Business and Administration (B&A). Programmes in the OUHK are mainly at undergraduate level and there are a dozen graduate level programmes. About 2/3 of the courses in the OUHK are delivered in English and the rest in Chinese. There are 2 semesters in a year, starting from April and October respectively. There are 5-credit courses and 10-credit courses in the OUHK, and they last for half and one year respectively.

Students of the October semester of 2005 were chosen for the subjects of the pilot study. 10-credit courses with approximately equal number of students were selected. One-year long 10-credit courses were chosen to ensure that all the respondents could have adequate experience in the online conference when answering the questionnaire. The courses selected should have approximately equal number of students so that the numbers of messages in the courses concerned as well as the frequencies coded in the content analyses were comparable.

A total of 8 courses were identified from the October semester of 2005, two from each of the 4 Schools. The 8 corresponding course coordinators were then asked for their consent to have students in their courses participating in the survey and the conference messages being analyzed. However, after long negotiation with those course coordinators, only four of them agreed to take part in the study. No course in the School of E&L was included in the pilot study since the School was quite reluctant to have their students' conference messages disclosed. Two courses were taken from the School of S&T, and the other two were from A&SS and B&A.

Each of the four 10-credit courses had about 50 students. Two courses were delivered in English and the other two in Chinese. The conference messages of the 4 selected courses in the pilot study were subjects for content analysis. Course coordinators were assured that students' profiles, the content of the conference messages, and even the course codes would not be disclosed.

Data collection procedures

The questionnaire was delivered in the form of an online survey. In early March 2006, with the consent of the course coordinators, an informed consent letter was sent to the students by the present researcher by email. As suggested by Creswell (2005), an informed consent form is a statement that participants sign before they participate in

research. The form should state clearly that the researcher will guarantee them certain rights, and that when they sign the form, or return the instrument, they are agreeing to be involved in the study and acknowledge the protection of their rights.

In the informed consent letter, a clear description of the present study was given as an introduction, and students were invited to fill in the pilot questionnaire. Students responded to the invitation on an entirely voluntary basis, and they were promised the data would be recorded anonymously. Those who refused to participate could simply ignore the invitation and would have no consequences of any kind. The informed consent letters, both English and Chinese versions, are showed in Appendix 3. Before actually sending out the informed consent letters and online questionnaire, these documents were sent to Ethics Advisory Committee in Durham University, together with the questionnaire and an Application Form for Research Ethics Approval of Work with Human Participants (Form EC2).

The online questionnaire was sent out on the 10th of March 2006, i.e. more than 5 months after the commencement of the 2-semester courses which started in October 2005. Respondents, therefore, were assumed to be familiar with the online conference and had got practical experience in it. The online questionnaire was posted for 2 weeks, and a total of 38 respondents filled in the questionnaire. The response for the survey was found to be 18.72% (see Table 3.2).

The number of respondents and the response rate in each course and the overall response rate are shown below.

Table 3.2 Courses selected for the pilot study and the response rate

School	Course	Subject	Medium of instruction	No. of students	No. of respondents	Response rate (%)
A&SS	A	Arts	Chinese	53	7	13.21
B&A	B	Business	English	51	13	25.49
S&T	C	Computer Science	English	51	12	23.53
S&T	D	Nursing	Chinese	48	6	12.50
			Total	203	38	18.72

As the online questionnaire was delivered through the OLE (Online Learning Environment) of the OUHK, respondents' responses were recorded and stored in the system. A set of computer-readable data in spreadsheet format could be generated automatically.

Result

The pilot study was designed to test the reliability of the scales in the questionnaire, and the validity of the scales examining the cognitive, social and teaching presences. Relevant data for the above objectives are summarized in this section.

For the reliability of the scales measuring different perceived presences in online conference messages, Cronbach alpha coefficients of different scales and sub-scales of the three presences were computed. The results are shown in the table below:

Table 3.3 Reliabilities of different scales in the questionnaire

Presence	**Components (no. of items)**	**Cronbach alpha of sub-scale**	**Cronbach alpha**
Cognitive presence	Triggering events (2)	0.958	0.953
	Exploration (5)	0.881	
	Integration (4)	0.889	
	Resolution (2)	0.914	
Social presence	Affective responses (3)	0.650	0.907
	Open communication (6)	0.884	
	Cohesive responses (3)	0.803	
Teaching presence	Instructional design & organization (6)	0.928	0.961
	Facilitating discourse (6)	0.884	
	Direct instruction (7)	0.899	

Most texts of research methodology suggest that Cronbach's alpha should be 0.70 or higher for an internally consistent scale (Wallen & Fraenkel 2001, Pallant 2001). The Cronbach alphas of the three scales for cognitive, social and teaching presences were 0.953, 0.907, and 0.961 respectively. The high alpha values denoted satisfactory internal consistency of the three scales. Since there are three or four sub-scales in each of the three constructs of perceived presences, Cronbach alphas of the sub-scales were also examined. Cronbach alphas of the sub-scales were also found satisfactory, except the one for "affective responses" (alpha = 0.650), which is an element of social presence. As stated by Pallant (2001), Cronbach alpha is sensitive to the number of items in the scale. Short scales with item number less than 10 may easily give low Cronbach values. In such a case, Pallant (2001) suggests that it may be more appropriate to report the mean inter-item correlation for the items. The mean inter-items correlations for the 3 items in "cohesive responses" was found to be 0.371, while Briggs and Cheek (1986) recommend an "optimal range" of 0.2 to 0.4.

Cronbach alphas of the two dependent variables in the present study, i.e., satisfaction towards the use of online conference and the perceived attainment, were also examined.

According to Strachota (2003), the students' satisfaction scale has good internal consistency, with a Cronbach alpha coefficient reported of 0.90. In the present study, the Cronbach alpha coefficient was 0.904. For the perceived attainment scale, Shin and Chan (2004) reported a Cronbach alpha coefficient of 0.893, and the modified attainment scale in the present study was 0.943.

The mean scores of different presences and the corresponding standard deviations (*s.d.*) of the 4 courses are listed below:

Table 3.4 The result of the perceptions of various presences in the pilot study

Course	**Cognitive presence**		**Social presence**		**Teaching presence**	
	mean	**s.d.**	**Mean**	**s.d.**	**Mean**	**s.d.**
A	2.5768	0.5213	2.5936	0.7603	2.6500	0.8790
B	2.8317	0.4979	2.3718	0.6356	2.4847	0.6819
C	3.4771	0.8451	3.0463	0.8022	3.3142	0.9270
D	2.4563	1.1039	1.9352	0.5957	1.7288	0.5375

In general, the perceived presences in course A, B and D were low, having a mean score below 3 from a 5-point Likert scale. Students in course D even reported a mean score lower than 2 in social and teaching presences. Students in course C, however, showed a comparatively high perception of the presences, especially in cognitive presence ($\bar{x} = 3.4771$) and teaching presence ($\bar{x} = 3.3142$). The data collected in the pilot study showed clearly that students in different courses had quite different perceptions of the various presences.

The measures of perceived presence collected by the preliminary questionnaire were then compared with those obtained by content analyses of the messages in online conference. This is to check if the perceived presences of students can effectively represent the various presences in conference messages.

3.3.1.3 Design and administration of content analyses

Essentially, the content analysis in the study is a replication of those studies conducted by Garrison and his colleagues, i.e., Rourke et al. (2001a), Garrison et al. (2000), Anderson et al. (2001). The same protocols or coding schemes, as shown in Table 2.2, 2.3 and 2.4, were adopted, and the unit of analysis and coding procedures were also followed (refer to section 2.2.4.4).

Sample

Before actual sampling of students' conference messages for content analysis, the present researcher was fully aware of the policies regarding the use of students' messages in the OLE of the OUHK. Although students in the OUHK "are fully informed of both the Personal Data Protection Policy and that their postings [in OLE] may be viewed by administrators and/or researchers" (Centre for Research in Distance and Adult Learning, or CRIDAL 2005), researchers in the OUHK have to seek permission from the corresponding course-coordinator when their conference messages of courses are analyzed. In fact, the CRIDAL of the OUHK makes explicit requirement of researchers using the contents of discussion boards.

> "OUHK researchers must obtain permission from the Course Co-ordinator of the targeted course to gain access to an online discussion group. This will usually be associated with a formal research project, assessed and approved through such bodies as the PACRD or the RGC." (CRIDAL 2005)

18 course-coordinators were approached for permission to apply content analysis to the conference messages in their courses, but their responses were rather reluctant. Only

one or two course coordinators in each School permitted the request, but none for the School of E&L. No personal information of any kind, including student number and name, were allowed to be disclosed in any reports.

In the previous content-analysis studies of various presences of the CoI model, only conference messages in a week were selected as sample of analyses (Garrison et al. 2001, Rourke et al. 2001a, Anderson et al. 2001). This may again reflect how "difficult, frustrating, and time-consuming" the task is (Rourke et al. 2001b). In the present study, a similar arrangement was made but a longer period was taken so as to ensure that there were substantial number of messages in each of the courses selected, especially when it was found that the participation rates in some of the selected courses were comparatively low. The messages within a month, i.e., from the 10th of February to the 9th of March in 2006, were selected to be analyzed, However, owing to limitation of resources, it is infeasible to include all the messages posted in the courses, i.e., that were messages posted in more than 5 months, from October 2005 to early March 2006.

Moreover, since some of the students might have little experience on online conference before the beginning of the courses under examination, the messages in the first few months might not reflect the regular use of the communication tool. The messages in the period chosen for content analysis would probably have greater influences on how respondents' respond when they answered the survey in March. The numbers of messages posted in the four courses are shown below in Table 3.5.

Table 3.5 Number of posting in the selected courses for content analysis

	Course A	**Course B**	**Course C**	**Course D**	**Total**
No. of postings by students	39	28	63	12	142
No. of postings by tutors*	6	5	15	4	30
Total no. of posting	45	33	78	16	172

*Tutors here included group tutors and course coordinators

Raters and inter-rater reliability

There were two raters in the present study. The first rater was the present researcher, and the other was a colleague of his, both serving as course designers in the Open University of Hong Kong. The first rater was the chief rater of the quantitative content analysis, who analyzed the sample messages of all the 4 selected courses. The second rater, who helped to establish the inter-rater reliability, analyzed the messages in only one course. The second rater was briefed on the CoI model and the coding schemes for various presences before the commencement of the analyses. The studies conducted by Garrison and his colleagues were also reviewed and discussed by the raters, so as to make sure that both raters shared the same understanding of the coding schemes.

The inter-rater reliabilities, i.e. agreement among coders about the categorization of content (Bullen 1998), of the three coding schemes were found to be acceptable in the earlier studies (Garrison et al. 2001, Rourke et al. 2001a, Anderson et al. 2001), but the present researcher decided to replicate the inter-rater reliability test so as to ensure the content analyses in the present study were on the right track. Both raters in the study rated all the messages of Course A, following the coding schemes, units of analysis, and coding principles for various presences.

Holsti's (1969) coefficient of reliability (C.R.) was employed in the present study, and the C.R. of the different coding schemes are listed in the following table.

Table 3.6 The C.R. of the coding schemes of content analysis

	n_1	n_2	m	C.R.
Cognitive presence	34	36	30	0.86
Social presence	93	89	85	0.93
Teaching presence	22	25	20	0.85

Where $C.R. = \frac{2m}{n_1 + n_2}$, and

m = the number of coding decisions upon which the two coders agree;

n_1 = number of coding decisions made by the first rater;

n_2 = number of coding decisions made by the second rater.

The C.R. of the coding schemes of the cognitive, social, and teaching presences were 0.86, 0.93, and 0.85 respectively. As Riffe, Lacy, and Fico (1998) suggest a C.R. of 0.8 as the minium level, the inter-rater reliability of the content analysis in the pilot study were therefore quite acceptable. The result was also comparable to the replicated studies by Garrison and his research team (Rourke et al. 2001a, Anderson et al. 2001, Garrison et al. 2001).

When the inter-rater reliability of the three coding schemes was verified, it was assumed that the instruments were reliable among different raters. Since the second rater had coded the messages in only one course for the purpose of inter-rater reliability, the result of the content analysis shown in the following sections are entirely from the first rater.

Result

The result of the content analyses of the four courses is presented in the following table, where the frequencies of each of the three presences as well as those for the sub-scales are reported.

Table 3.7 Frequencies of recordings in various presences in content analysis

		Course A	**Course B**	**Course C**	**Course D**
Cognitive Presence	Triggering events	9	9	13	5
	Exploration	16	9	26	6
	Integration	7	6	12	1
	Resolution	2	6	6	0
	Total	**34**	**30**	**57**	**12**
Social Presence	Affective responses	13	9	41	3
	Open communication	71	50	103	18
	Cohesive responses	9	11	22	7
	Total	**93**	**70**	**166**	**28**
Teaching Presence	ID & organization	4	4	5	1
	Facilitating discourse	8	6	10	2
	Direct instruction	10	8	9	2
	Total	**22**	**18**	**24**	**5**

It is obvious that in the four courses, the frequencies of recording in various presences are quite different. It is worth noticing that in Course C, the frequencies of all the three presences were the highest among the four courses. The frequency of social presence in Course C was remarkably high, while the frequency of teaching presence was about the same as in Course A. The Course D in a nursing programme, however, showed low readings in all the three presences. Tutors' participation in Course D was comparatively low, and so was that of the students'. The frequencies of recording in various presences in content analysis were comparable to the students' and tutors' number of postings recorded in Table 3.5. The frequencies of social presence were much higher than the number of postings, and the frequencies of teaching presence were higher than the number of tutors' postings because in these two presences, there could be multiple recordings in a single message.

The elaborated result of the three content analyses is shown in Appendix 4, where the breakdowns of the sub-scales of the various presences are also shown in a tabular form. Based on the result of the survey and that of content analysis, the following section is going to establish the validity of the scales.

3.3.1.4 Validity of the scales for various presences

An instrument is considered to be valid when it actually measures what it is supposed to measure. There are different forms of validity, and traditionally, researchers' main concerns are content validity, criterion-related validity and construct validity (De Vaus 1996, Creswell 2005).

Messick (1989) states that "content validity is based on professional judgments about the relevance of the test content to the content of a particular behavioural domain of interest and about the representativeness with which item or task content covers that domain" (p. 17). Since the items for various presences in the questionnaire were directly translated form the protocols of the model of CoI, and verified by online learning specialists, the content validity of the questionnaire is assumed.

Criterion-related validity, which "determines whether the scores from an instrument are a good predictor of some outcome (or criterion) they expected to predict" (Creswell 2005: 165), is another concern. As the questionnaire is designed to replace the content analysis in measuring the various presences in conference messages, the best way to validate the questionnaire is to compare the data collected in the survey with those from content analysis. De Vaus (2002) argues that "if the responses on both the new and the established measure are highly correlated the new measure is considered to be valid" (p.27-27). Creswell (2005) further suggests that a high correlation of 0.6 or above indicates a positive relationship for establishing criterion-related validity. The following table shows the frequencies of the various presences coded by content

analyses (CA), and they are compared with the scores of perceived presences collected through questionnaire (survey) in the pilot study.

Table 3.8 Data of various presences from content analysis and survey

Course	Cognitive presence		Social presence		Teaching presence	
	Freq (CA)	Score (survey)	Freq (CA)	Score (survey)	Freq (CA)	Score (survey)
A	34	2.5768	93	2.7937	22	2.6077
B	30	2.8317	70	2.3718	18	2.4847
C	57	3.4771	166	3.0463	24	3.3142
D	12	2.4563	28	1.9352	5	1.7288

*Freq (CA)-The frequency of certain presence revealed by content analysis
Score (survey)- The mean score of the perceived presence by survey

A Pearson product-moment correlation was then conducted, in order to check if the perceived presences collected from the questionnaire were good representations of content analyses in exploring various presences in online conferencing. Since it was expected that the variables collected by different methods were positively correlated, a 1-tailed significance test was employed for this directional hypothsis (Pallant 2001, Creswell 2005).

Table 3.9 Correlations between various presences from content analysis and survey

		CP_Survey	SP_Survey	TP_Survey
CP_CA#	Pearson correlation	.914*		
	Sig. (1-tailed)	.043		
SP_CA	Pearson correlation		0.946*	
	Sig. (1-tailed)		.027	
TP_CA	Pearson correlation			.928*
	Sig. (1-tailed)			.036

* Correlation is significant at the 0.05 level (1-tailed)
# CP- cognitive presence; SP- social presence; TP- teaching presence
CA- content analysis

Although there were only 4 courses in the pilot study, the perceived presences collected by questionnaire and the corresponding presences reflected in conference messages showed positive and strong correlations. The correlation coefficients were 0.914 (n=4, p=0.043) for cognitive presence, 0.946 (n=4, p=0.027) for social presence, and 0.928 for teaching presence (n=4, p=0.036), all were statistically significant beyond the 0.05 level. The significant correlations between the two measurements show that the criterion-related validities of the scales of various presences in the questionnaire are evident.

Some writers advocate that researchers should also examine the construct validity of an instrument, i.e., to estimate "how well does a measure of the construct explain differences in the behaviour of individuals or their performance on certain task" (Fraenkel & Wallen 2003:159). To obtain the construct-related validity of an instrument, Fraenkel and Wallen (2003) suggest there should be the following three steps:

- the variable being measured is clearly defined;
- hypotheses, based on a theory underlying the variable, are formed;
- the hypotheses are tested both logically and empirically.

In the preliminary stage of developing scales for various presences, it is not feasible to establish construct validity of them. Rather, it is one of the tasks of the present study to examine the construct validity of the three scales of the perceived presences in CoI. Nevertheless, since content validity and criterion-related validity were both justified, the validity of the scales for various presences in the present study was then assumed.

3.3.2 Main survey

The second part of the present study was devoted to revealing the interrelationship among the three presences of the model of CoI, and the relations between various presences and students' participation, perceived attainment and satisfaction. A comparatively large-scale student survey was employed. The design of the questionnaire and procedures are provided in the following sections.

3.3.2.1 Sample

In the main survey, students from a number of courses from each of the four Schools in the OUHK were invited to respond to the online questionnaire.

The present researcher sought the agreement of 14 course coordinators in different Schools. The course coordinators were selected because the present researcher had some kind of cooperation with them previously. Among the 14 course coordinators, 2 of them rejected. Students from a total of 34 courses were contacted in the main survey, and the total number of enrolled students in those courses was 1452. In October 2005, there were 388 courses offered in the OUHK and the total number of students enrolled in distance learning courses was 17296 students (OUHK 2006).

Table 3.10 Number of courses and students involved in the main survey

School	Number of courses	Total number of students enrolled
A&SS	15	686
B&A	7	265
E&L	5	266
S&T	7	235
Total	**34**	**1452**

Just like the pilot study conducted in March, only 10-credit courses were selected in the main study. It was to ensure that respondents had already got substantial experience in using the online conference when answering the questionnaire.

Since the survey was to collect students' reflections on the use of online conference in their learning, only students who had actual participation in the conference could be counted. However, as reported by some studies on online learning in the OUHK (Choi & Tsang 2001, Tsang et al. 2002), students' participation rate in the non-compulsory online learning platform was far from enthusiastic. Some students in the OUHK did not log-in to the OLE regularly and had very little experience on the online conference (Tsang et al. 2002, Fung 2004). In order to ignore those respondents who had not actually participated in the online conference regularly, only those respondents who had ever logged-in the OLE and had read 10 or more messages in the online conference were counted. A more rigorous criterion had also been considered, but it severely affected the return rate. In fact, as reported in the next chapter, after filtering out the non-active respondents who had read less than 10 messages, nearly one-quarter of the respondents in the main survey had been eliminated.

3.3.2.2 Data collection procedures

Just like the preliminary survey, the main questionnaire was posted in the OLE platform of the OUHK, and the same letter of consent was sent to students of the courses selected on the same day, i.e. the 20th April, 2006.

The online questionnaire had been posted in the OLE for 2 weeks. One week after the first invitation email, another email was sent, requesting participation again, as multiple contacts is considered a means to increase response rate (Schaefer & Dillman 1998).

The collected data were then generated in to an Excel file, which is readable to SPSS for Windows.

3.4 Data analysis

Besides the open-ended question in the questionnaire for main survey, all data collected from the pilot and main survey were quantitatively analyzed. All data analyses were performed using SPSS, the Statistical Package for the Social Sciences (version 13).

Analysis to address research question 1: "How is the online conference used and perceived as a learning tool of distance learning courses among students in the OUHK?" used the Frequency programme to calculate descriptive statistics such as the mean, and standard deviation of those continuous variables, i.e., cognitive presence, social presence, teaching presence, participation (including productive and receptive participation) in online conferencing, perceived attainment and satisfaction. One-way ANOVA was then conducted to compare data from different Schools and demographic categories, which tested the 6 hypotheses regarding research question 1.

Analysis to address research question 2: "Can the 'Community of Inquiry' model, in which the three types of 'presence' perceived are independent variables, help us to understand students' participation, perceived attainment, and satisfaction in online conference?" employed Pearson product moment correlations and ANOVA to compare the participation, perceived attainment, and satisfaction between students with various levels of perceived cognitive, social and teaching presences. Hypotheses 7-15 were then tested. To further investigate if the CoI model, i.e., three presences as a whole, was a good predictor of students' participation, perceived attainment, and satisfaction, a series of multiple regression analyses were also conducted, and these tested hypotheses 16-18. Multiple regression was chosen because this technique is

particularly suitable for investigating the linear relationship between a set of predictor variables and one criterion variable (Kerr, Hall & Kozub 2002:179).

Analysis to address research question 3: "What are the statistical correlations between the perceived teaching, cognitive and social presences in the "Community of Inquiry" model?" utilized Pearson product moment correlations to examine the inter-relationships of the three presences in a model. The multiple regression conducted for research question 2 also provided some hints.

Since the main instrument of the present study is an online questionnaire, and the items were in the form of 5-point Likert scale, the variables were ordinal by their nature. Some social scientists insist that powerful statistical methods such as correlation, F-test and regression assume that variables are measured at the interval level (Bryman & Cramer 1997), but there are quiet different points of view. DeVaus (2002), for example, states:

> Many statisticians argue that some statistical techniques are 'robust' and that treating ordinal variables as though they were interval does not affect results. In practice, this relaxed approach is frequently adopted with scales and other ordinal variables with a large number of values. (p.45)

Labovitz (1970) even suggests that almost all ordinal variables can be and should be treated as interval variables. He argues that the possible error is minimal, when compared with the considerable advantages that can accrue by using powerful techniques of analysis like correlation and regression. Kerlinger and Lee (2000) also agree that it is safe to treat ordinal data as interval. Desselle (2005) contend that data gathered from summated rating scales, though ordinal in nature, may be analysed with parametric statistics, especially when the summed responses are normally distributed. Since all the scales in the present study are summated scales, in view of the strength and flexibility of the parametric tests as well as the relative ease to interpret, the

present study adopted parametric tests in all the inferential statistics.

Besides the various summated scales, there was also an open-ended question at the end of the online questionnaire, in which students were encouraged to give any comments on the use of online conference. Students' comments on the use and expectation of the online conference were expected, and these would probably provide supplementary information for research question 1, and might also shed light on the research questions 2 and 3. Responses of the open-ended question were first inductively analysed, in order to identify the recurrent themes. The themes were then categorized into analysis framework. By using the framework constructed, each of the responses was then analyzed in a thematic approach. The identified themes were then coded into the framework. The frequency of each of the themes was recorded. Interpretation was then based on the frequencies of the recurring themes.

Chapter 4 - Data analysis

4.1 Introduction

This chapter presents an analysis of the data collected in the main study, which includes responses from the online survey and the participation records of the respondents from the OLE of the OUHK. There are four sections in this chapter. After the introduction, the second section is a summary of the survey response rate and the demographic data. The third section presents the analyses of the data thereby answering the research questions and evaluating the hypotheses. The last section reports the responses in the last open-ended question in the questionnaire.

4.2 Descriptive statistics

4.2.1 Survey Response rate

After posting the main online survey for 2 weeks, there were 212 respondents from the 34 courses who completed the online questionnaire. When comparing the total number of students in the 34 courses, i.e., 1452, the response rate was only 14.6%. According to a review of the literature on online survey, Schonlau, Fricker & Elliott (2001) report that online survey response rates ranged from 7-44% whereas email survey response rates ranged from 6-68% (p.90-91). The response rate of the present study was therefore on the low side. An earlier online survey for evaluation of the OLE (Choi & Tsang 2001) also reported a comparatively low response rate of 18.8% (240 out of 1695). Another official evaluative survey in 2003 got only 135 valid responses (4.2%) out of 3250 students (ETPU 2003).

The low participation rate, however, could be explained by the low participation rate of the OLE. Since the use of OLE and its online communication tool was non-mandatory in the OUHK, there were always non-active users who had rarely logged-in the OLE,

not to say reading or posting messages in the conference. (Choi & Tsang 2001, ETPU 2003).

Among the 212 respondents, 50 of them had read less than 10 messages during the first 6 months (from October 2005 to end of March 2006) and were considered non-active respondents. The non-active users had little, if any, firsthand experience of the communication tool, and their responses might not reflect regular users' views towards the online conference. Therefore, the responses of those non-active users were not counted in the present study.

Disregarding the non-active participants among the 212 respondents, 162 completed returns were considered valid responses. The 162 respondents came from 29 different courses in the 4 Schools. Among the 34 courses selected for the main study, 5 of them did not give any valid respondents. The details of the response rate in each of the selected courses are presented in Appendix 5. The participation rate of the main survey was therefore 11.16%, which is on the low side of the range revealed by Schonlau, Fricker & Elliott (2001). Nevertheless, the response rate from different courses was quite varied, ranging from 0% to 28.52%, and therefore the responses from the sample could be biased. The low response rate and the nature of the biased sample may influence the generalizability of the result.

4.2.2 Demographic data

Gender and Age

Among the 162 respondents, 70 (43.2%) were male and 92 (56.8%) were female. This was parallel to the male-female ratio of the OUHK in 2005, which was 46.7% to 53.3% (OUHK 2006).

Table 4.1 Gender and age of respondents

Age group \ Gender	Male	Female	Sub-total	Entire cohort of students
17-27	10 (6.2%)	17 (10.5%)	27 (16.7%)	13.4%
28-37	23 (14.2%)	36 (22.2%)	59 (36.4%)	39.0%
38-47	24 (14.8%)	33 (20.4%)	57 (35.2%)	33.9%
48-57	12 (7.4%)	6 (3.7%)	18 (11.1%)	13.7%
58 or above	1 (0.6%)	0 (0.0%)	1 (0.6%)	0.0%
Sub-total	70 (43.2%)	92 (56.8%)	162 (100%)	100%

The majority of the respondents were from the 28-37 year old group (36.4%) and 38-47 year old group (35.2%). The youngest group, i.e., those aged between 17-27 , had 27 respondents (16.7%), and 18 respondents were from the 48-57 year old group (11.1%). There was only one respondent who was 58 or above. The allocation of age in the respondents (See Table 4.1) was therefore quite similar to the entire cohort of students in the same year in the OUHK (OUHK 2006). The sample was therefore considered to be representative in terms of gender and age.

Schools enrolled and medium of instruction

Students from the School of Science and Technology had the highest response rate (13.62%), while the response rate of the other 3 Schools were close to each other, from 10.35 % to 11.28%.

Table 4.2 Response rate of students in different Schools and media of instruction

School	Medium of instruction (no. of courses)	No. of students in the selected courses		No. of active respondents		Response rate (%)	
A&SS	Chinese (9)	380	686	33	71	8.68%	10.35%
	English (5)	306		38		12.42%	
B&A	Chinese (3)	117	265	15	29	12.82%	10.94%
	English (2)	148		14		9.46%	
E&L	Chinese (3)	48	266	3	30	6.25%	11.28%
	English (1)	218		27		12.39%	
S&T	Chinese (1)	48	235	3	32	6.25%	13.62%
	English (5)	187		29		15.51%	
Total		1452		162		11.16%	

Courses delivered in different mediums seemed to have different response rates. Except the School of B&A, students from the courses delivered in English had a higher response rate than those from courses delivered in Chinese. Overall, 12.57% of the students in English courses responded to the survey, but only 9.11% of the students from the Chinese courses. This is parallel to an earlier survey on the use of OLE in the OUHK, which revealed that students taking courses in the medium of English participated more actively than those learning in Chinese (ETPU 2003).

Internet connection

As the broadband internet service was quite popular in Hong Kong, 152 out of 162 (93.8%) respondents reported that they were using broadband Internet service, while only 3 respondents (1.9%) used modems. The remaining 7 respondents could not tell the type of Internet service they were using.

Table 4.3 Internet connection of respondents

Internet connection	Frequency	%
Modem	3	1.9
Broadband service	152	93.8
No idea	7	4.3
Total	162	100

Computer/Internet proficiency

A majority (80.9%) of the respondents were quite confident in using computers and Internet service, and they classified themselves as either intermediate users (69.8%) or experts (18%) in using computers and Internet technology. But still 31 respondents (19.1%) claimed to be beginners of ICT.

Table 4.4 Computer/Internet proficiency of respondents

Computer /Internet proficiency	frequency	%
Beginner	31	19.1
Intermediate user	113	69.8
Expert	18	11.1
Total	162	100

Experience of OLE

Among the respondents, most of them were experienced users of the OLE in the OUHK, and they had some experience of the learning platform before the course they were doing. 78 (48.1%) of them had taken 3 or more courses with the support of the OLE before. Only 10 respondents (6.2%) said that the course they were doing was the first OLE-supported course they took in the OUHK.

Table 4.5 Respondents' experience of OLE

No. of OLE-supported course taken in the OUHK	frequency	%
Nil	10	6.2
1	35	21.6
2	39	24.1
3 or more	78	48.1
Total	162	100

Overall, it is found that though the return rate is low, the sample of students involved in the present study is representative.

4.3 Research questions and results

In this section, answers to the three research questions in the present study are presented.

4.3.1 OUHK Students' perceptions of the use of online conference

To answer the first research question "How is the online conference used and perceived as a learning tool of distance learning courses among students in the OUHK?", a descriptive analysis of students' perceptions, particularly on the cognitive, social, and teaching presences, was conducted. Students' participation in the online conference, their satisfaction, and perceived attainment through the online conferencing are also reported. Comparisons of the above variables between respondents from different Schools were made by one-way ANOVA, and the first 6 hypotheses were then tested. In the last part of this section, the responses for the open-ended question in the survey are also analyzed and reported.

Students' perceptions of various presences

Students' perceptions of various presences are summarized in Table 4.6, which shows the means and standard deviations of the three perceived presences of students from different schools. The statistics of the various sub-scales are also reported.

In terms of the average total scores, cognitive presence was found to be dominant among the three presences being explored. Having a mean score of 2.92 out of a 5-point scale, however, it was only mildly perceived. The mean scores of social presence and teaching presence were even lower, being 2.70 and 2.69 respectively. The highest score in cognitive presence reflect that in general, subject-related discussion was the major theme in the conference messages, while social interaction or tutors' guidance were comparatively infrequent.

Among the four phases of practical inquiry, which constitute the concept of cognitive presence, respondents from all the four Schools generally reported that the frequencies of triggering event were the highest, and the occurrence of subsequent phases went gradually down. Resolution of problems was found to be the least frequent, and this is parallel to the findings of previous content analyses (see Garrison et al. 2000, Meyer 2003, Choi et al. 2004).

For social presence, respondents reported that open communication was the most frequent component among the others. Affective response, however, was comparatively uncommon. It reflected that the online learners in the OUHK did not express their emotions very often in their communication via online conference.

The scores for teaching presence in the four schools suggested that teaching presence was rarely perceived in the online conference. Among the 4 schools, only the respondents in the School of E&L gave an overall score higher than 3 in the 5-point scale. The low scores in the other schools indicated that respondents did not perceive

an active role of their instructors in the online conferences.

Table 4.6 Students' perceptions of various components of presences

Presence	Components	School				Total (n=162)	
		A&SS (n=71)	B&A (n=29)	E&L (n=30)	S&T (n=32)	Mean	s.d.
Cognitive presence	Triggering event	3.07	3.21	3.05	3.36	3.15	0.94
	Exploration	2.84	2.89	3.15	3.06	2.95	0.86
	Integration	2.68	2.82	3.12	3.09	2.87	0.87
	Resolution	2.58	2.47	3.25	2.84	2.73	0.93
	Total	**2.79**	**2.85**	**3.14**	**3.09**	**2.92**	**0.78**
Social presence	Affective response	2.37	2.40	2.81	2.25	2.43	0.86
	Open communication	2.96	2.95	3.25	3.09	3.04	0.85
	Cohesive response	2.62	2.55	2.61	2.69	2.62	0.85
	Total	**2.65**	**2.63**	**2.89**	**2.68**	**2.70**	**0.73**
Teaching presence	Instructional design	2.33	2.00	2.74	2.20	2.32	0.91
	Facilitating discourse	2.90	2.48	3.48	2.87	2.93	0.95
	Direct instruction	2.71	2.48	3.19	3.00	2.81	0.88
	Total	**2.65**	**2.32**	**3.14**	**2.69**	**2.69**	**0.84**

A one-way between-group analysis of variances (ANOVA) was then conducted to explore if there were differences among respondents from different schools. The first three hypotheses (H_1-H_3) were then test.

H_1: Students taking courses from different Schools in the OUHK have different level of perceived cognitive presence in online conference.

H_2: Students taking courses from different Schools in the OUHK have different level of perceived social presence in online conference.

H_3: Students taking courses from different Schools in the OUHK have different level of perceived teaching presence in online conference.

As shown in Table 4.7 below, there was no significant difference at the 0.05 level in either cognitive or social presences from students in different schools.

Table 4.7 ANOVA of various presences among learners in different schools

		Sum of Squares	df	Mean Square	F	Sig.
Cognitive presence	Between groups	3.681	3	1.227	2.033	0.111
	Within groups	95.367	158	0.604		
	Total	99.048	161			
Social presence	Between groups	1.427	3	0.476	0.899	0.443
	Within groups	83.630	158	0.529		
	Total	85.057	161			
Teaching presence	Between groups	10.065	3	3.355	5.087	0.002**
	Within groups	104.198	158	0.659		
	Total	114.263	161			

**p<0.01

However, in teaching presence, there was a statistically significant difference among them [$F(3,158)=5.087$, $p=0.002$]. In order to have multiple comparisons among various groups, post-hoc comparisons using the Tukey's HSD test were conducted. The unequal group sizes were then corrected by Tukey-Kramer adjustment (Wilkinson 1990) automatically in SPSS. The result indicated the mean score for school of E&L ($\bar{x}$ =3.1360) was significantly different from school of A&SS ($\bar{x}$ =2.6467) and B&A ($\bar{x}$ =2.3202).

The significant teaching presence in the conferences of courses in one particular School is worth noting. While the teaching presence perceived was generally uncommon in most of the other Schools, tutors in the School of E&L seemed to be providing a different level of support in terms of instructional design, facilitation, and direct instruction. It might be because of the tutors in the School of E&L generally had

better online pedagogical skills or were just more enthusiastic in online teaching, or teaching in general. The real factor contributing to their active participation is, nevertheless, worth further exploration.

Table 4.6 also shows that students in the School of E&L did not only report the highest score in teaching presence, but also in social and cognitive presence. Further discussion of the relationship of the three presences is discussed in later sections.

Students' participation in online conference

Table 4.8 shows the respondents' participation in the online conference. In general, the respondents did not participate actively in the conference. On average, each respondent had posted less than 4 messages ($\bar{x}$ =3.88) in mid-April 2006, about 6 months after the courses were started. The productive participation rate, in terms of number of postings in the conference, was considered to be very low by any means.

Table 4.8 Respondents' average numbers of posting and readings in different Schools

	School				Total (n=162)	
	A&SS (n=71)	B&A (n=29)	E&L (n=30)	S&T (n=32)	Mean	s.d.
Average no. of postings started	1.18	0.90	0.17	2.63	1.23	3.22
Average no. of postings replied	2.58	3.14	0.13	4.75	2.65	7.00
Average no. of postings	3.76	4.03	0.30	7.38	3.88	9.77
Average no. of reading	98.08	78.52	101.30	335.22	142.02	182.36

Compared with posting, respondents were much more active in reading messages in the conference, and each respondent read 142.02 messages on average during the 6 months. When comparing the numbers of postings which start a new thread and those

replying to others, respondents from all Schools except E&L were found to be more active in giving responses to other postings, but not in starting a new thread themselves. In most of the discussion forums in the web, it is very common to have a series of replies in each new thread. The data from the School of E&L reflected that most of their students played the role of a lurker, i.e., they read the online messages very often but seldom posted a new thread or replied to other messages. As a result, some of the new threads in the conferences of the School of E&L were only read, but not responded to.

The next hypothesis to be tested is about students' participation in the online conference in the OLE, which is called discussion board in the system.

H_4: *Students taking courses from different Schools in the OUHK have different level of participation in online conference.*

The average numbers of posting and reading in Table 4.8 show that respondents from different schools had quite different participation. The average number of postings in the four schools ranged from 0.3 to 7.38, and that of reading from 78.52 to 335.22. One-way ANOVA was conducted to examine if there were significant differences in the number of postings and readings among respondents from different schools. The result is shown in Table 4.9 below.

Table 4.9 ANOVA of no. of postings and readings among learners in different schools

		Sum of Squares	df	Mean Square	F	Sig.
No. of Postings	Between groups	777.077	3	259.026	2.806	0.042 *
	Within groups	14585.695	158	92.315		
	Total	15362.772	161			
No. of Readings	Between groups	1498166.441	3	499388.814	20.463	0.000**
	Within groups	3855922.503	158	24404.573		
	Total	5354088.944	161			

*p< 0.05

**p< 0.01

It was found that there were significant differences at the 0.05 level in both average number of postings ([F(3,158)=5.087, p=0.042]) and average number of readings ([F(3,158)=5.087, p=0.000]). Post-hoc comparisons using the Tukey HSD test indicated that only the average number of postings for school of E&L ($\bar{x}$ =0.30) was significantly different from school of S&T ($\bar{x}$ =7.38). On the other hand, the high average number of readings in S&T ($\bar{x}$ =335.22) was significantly different from all the other three schools. The students in S&T were found to be much more active in the participation of online conference when compared to students from other schools.

One the contrary, respondents from school of E&L were the least enthusiastic to post messages in the conference. Among the 30 respondents, the average number of messages posted was as low as 0.3, while the respondents from others schools posted from 3.76 to 7.38 messages on average. However, respondents from school of E&L read the conference messages quite often. The average of the number of messages read in E&L was 101.3, higher than the figures from A&SS and B&A. That the extremely low frequency of postings went with much higher frequency of readings can perhaps be explained by the active participation of the tutors in the courses of E&L. In fact, tutors in the school of E&L were found to be more active than those of other schools.

According to the records from the OLE, each of the tutors of the selected courses in E&L had posted 16.3 messages on average during the 6 months, while tutors in A&SS, B&A and S&T were 4.2, 7.4, and 9.3 respectively.

Respondents from S&T were the most active among the four schools. Respondents from S&T posted more than 7 messages on average and read more than 350 messages during the period.

The participation rate of respondents in the online conference, therefore, varied between Schools. Most of the students, when participating in the conference, took a passive role and mainly read messages posted. This suggests that most respondents did expect information from the online conference, but they were not keen on posting messages themselves. They did not make full use of the online conference as an interactive communication tool.

Students' satisfaction and perceived attainment

For satisfaction towards the use of online conference, respondents from all the four schools showed quite positive attitudes, having a mean score of 3.74 in a 5-point scale (see Table 4.10). Though the respondents from E&L participated the least in the conference, they showed high satisfaction towards the communication tool. The satisfaction score of E&L respondents was as high as 3.93, which was the highest among the four schools.

Table 4.10 Students' satisfaction and perceived attainment

		School				Total (n=162)
		A&SS (n=71)	B&A (n=29)	E&L (n=30)	S&T (n=32)	
Satisfaction	Mean	3.74	3.48	3.93	3.81	3.74
	s.d.	0.95	0.99	0.68	0.88	0.90
Perceived attainment	Mean	3.19	3.00	3.59	3.28	3.25
	s.d.	0.95	0.96	0.77	1.04	0.95

Perceived attainment, which is defined as the perceived learning outcome from the online conference, was another major construct in the present study. Perceived attainment scores from students in different schools also suggest that students were quite positive on the online conference as a learning tool, but the average score of the four schools was only 3.25, much lower than the satisfaction score. Among the respondents from the four schools, those in E&L had highest perceived attainment, with a mean score of 3.59.

The low participation but high satisfaction and perceived attainment in the E&L, as suggested previously, may due to the high participation of tutors. Another possibility might be that the tutors in E&L adopt a different approach in their teaching in online conference, but it could be not verified since the present researcher had not reviewed the messages in their conferences. One course coordinator in the School of E&L, however, disclosed that tutors in their School often deliver lecture notes or other supplementary materials in the online conference. If it was a general practice of the tutors in the school of E&L, the high reading rate, high satisfaction and perceived achievement scores but low posting rate could be explained. However, in such a case, online conference was used as a platform for delivering materials instead of as a platform for discussion.

After general description of the satisfaction and perceived attainment of respondents from the four Schools, the following part is devoted to test another 2 hypotheses.

H_5: *Students taking courses from different Schools in the OUHK have different level of satisfaction in the use of online conference.*

H_6: *Students taking courses from different Schools in the OUHK have different level of perceived attainment in the use of online conference.*

A one-way ANOVA was conducted to explore if there were significant differences of satisfaction and perceived attainment among respondents from different schools.

Table 4.11 ANOVA of Satisfaction and Perceived attainment among learners in different schools

		Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Satisfaction	Between groups	3.207	3	1.069	1.328	0.267
	Within groups	127.230	158	0.805		
	Total	130.438	161			
Perceived Attainment	Between groups	5.667	3	1.889	2.128	0.099
	Within groups	140.235	158	0.888		
	Total	145.901	161			

As shown in the Table 4.11 above, there was no significant difference at the 0.05 level in both satisfaction (p=0.267) and perceived attainment (p=0.099) from students in different schools. Post-hoc comparisons using the Tukey HSD test also did not show significant difference among the four schools.

The findings show that students in all the four schools were generally positive towards the online conference as a learning tool, and there were no significant difference among students' satisfaction and perceived attainment. The findings were quite parallel to earlier OUHK studies (Choi & Tsang 2001, ETPU 2003). Nevertheless, students' low participation rate reported earlier suggests there might be room for further

improvement on student satisfaction and perceived attainment.

Students' responses to the open-ended question

The last question in the main survey was an open-ended question in which students were invited to comment on the "discussion board" in general. A total of 56 responses were made to the question, and they represent 34.6% of the respondents. Some of the responses were written in Chinese, and they were translated into English by the present researcher. The translation was then reviewed and verified by 2 professional translators who were colleagues of the present researcher. A dozen changes were proposed by the translators and they were agreed with by the present researcher. All the responses, including those written in Chinese and their English translation, are listed in Appendix 6 for reference.

After an inductive analysis of all the responses, comments on the use of online conference in the OUHK were found to fall into 4 major categories: comments related to the use of the conference, to tutors, to fellow students, and those related to the functionality of the conference system. There were also a couple of comments not falling into the 4 categories, and they were classified as "Others". Each of the responses was then analyzed by thematic approach. Similar to the approach used for the content analysis of social presence in the pilot study, a theme is "a single thought unit or idea unit that conveys a single item of information extracted from a segment of content" (Budd, Thorp & Donohew 1967: 34). While reading each of the responses analytically, the present researcher recorded the themes identified and the frequencies of recurring themes were also logged. Some longer responses contained more than one theme, and they were counted separately. The responses in the open-ended question were analyzed and are presented in Table 4.12.

Table 4.12 Themes of the comments in the open-ended question

Category	Themes	Frequency
Use of discussion board	Discussion board is an effective tool enhancing learning and communication.	8
	Discussion board is used mainly for Q&A or delivering materials, but not real discussion.	5
	Efficacy of discussion board relies on participation of tutors and students	5
	Text-based discussion is not effective for some subjects.	2
	Course coordinator's administration is important for successful conference.	1
	Large class may favour active participation	1
	Tutors should take turn to monitor the discussion board.	1
	Discussion board helps reducing lonely feeling.	1
Tutors	Tutors do not raise questions for discussion	6
	Tutors have low participation.	5
	Tutors do not offer guidance and constructive responses.	3
	Tutors do not make quick responses.	2
Fellow students	Students have low participation.	16
	Some students posted unrelated materials.	3
	Some students made unreasonable complaints.	1
Functionality of the system	There should be real-time communication tool.	4
	The discussion board should support video and audio communication.	2
	There should be classification of threads in the system..	2
	There should be some kind of alert when there are new messages posted.	1
	There should be drawing feature in the conference.	1
Others	There are discussion forum for OUHK students in the public domain.	1
	Irrelevant comments on OLE features, course materials, teaching in class, and tutors' performance.	4

As shown in the Table 4.12, respondents' comments in the open-ended questions were classified into 4 main categories. In each of the categories, there were recurring themes and these were considered to be respondents' common concerns.

For the use of discussion board, some respondents agreed that the tool was an effective learning and communication tool (n=8) which promoted learning and communication between students and their tutors. One respondent suggested that it could also help reducing loneliness in the process of distance learning (response 50 in Appendix 6).

Another respondent, who participated only as a lurker, found the discussion board "useful" and agreed that it provided "good learning aids" (response 40). Therefore, the online conference was well perceived by students as a learning support and it was successfully adopted in at least some courses.

However, some respondents reported that the system was used mainly as a platform for questions and answers (n=5) or delivery of materials (n=5), such as lecture notes or supplementary materials, but not for the kind of "real discussion" they expected. The online conference, in the eyes of these respondents, could not serve as an effective tool for knowledge construction because it was not properly used. Respondents reported that most of the questions posted in the conference were straight-forward questions which did not provoke much thinking. It seemed that both tutors and students had not fully utilized the conference as a collaborative learning tool. As reported by one respondent, a tutor even said that "discussion board is for student to find the answer within themselves" (response 6). This kind of conception reflected that the fullest use of online conference had not been well developed among the students and tutors.

It is, however, evident that students do have some expectations from the online conference. As it is shown in the responses made by students, they suggested different ways of promoting better discussion in the conference.

In the second category, i.e., comments related to tutors, most of the respondents complained that their tutors did not perform well in the online conference. Tutors were considered not to be participating actively in the conference (n=5), and they were also criticized on their "teaching" in online conferencing. Some respondents claimed that their tutors did not raise questions for discussion (n=6), or did not offer quick responses (n=2). Tutors were also criticized for not providing guidance or constructive responses (n=3). For those who made such comments on tutors' performance, the

teaching presence in the online conference did not satisfy them. Raising questions for discussion, giving constructive responses and guidance are in fact elements of cognitive and teaching presence. Respondents expected their tutors, or course coordinators, could provide better learning support in the conference they participated in.

Most of the comments to tutors are in fact criticisms, but there are still some descriptions of a good tutor:

> ".....In other course I studies before, like B825, the tutor will give us some open question and let us think about it and more participants are willing to share their ideas. Also, the tutor will keep in track to further questioning or feedback according to student opinion." (response 14)
>
> "Since the CC [course coordinator], tutors and students are very proactive in using the discussion board. I appreciate the quick responses from CC and tutors. It makes the discussion board as a very useful tool for course MT888. It leads to the consequence for stimulating me and other students to use it more frequently." (response 19)

The characteristics of good tutors here obviously echoed with the criticisms aforementioned. It shows that the expectations of a good online tutor are quite universal among students. Teaching presence and cognitive presence from tutors seem to be the major concerns of most of the respondents.

Respondents also commented bluntly on their fellow students on their use of online conference. According to most of the respondents, students did not actively participate in the conference (n=16), and it greatly reduced the efficacy of the system. This is parallel to the participation rate reflected by the questionnaire. Some respondents also complained that the discussion board was abused because students posted unreasonable complaints (n=1) or non-course-related materials (n=3). Without reviewing the content of the "unrelated" messages, one could not determine how "unrelated" the messages are. But messages reflecting social presence, such as salutations, use of humour,

self-disclosure, etc., can certainly be non-course-related, but are beneficial to establishing familiarity between members (Rourke & Anderson 2002). If messages of these kinds were not accepted in the online conference, it would be difficult to build up a sense of community. Nevertheless, students' participation in the conference is still the vital factor to the success of the conference. If only a small group of students were engaged in the discussion, the discussion board could not serve as a tool of constructing knowledge.

There were also some comments on the functionality of the conference system. A couple of requests asked for a function of assigning the threads into groups (n=2) which could help organizing the topics of discussion. Most of the other comments, however, are not relevant to the use of text-based conference system used in the OUHK. Some respondents asked for real-time communication tools in the OLE (n=4), and some suggested that the system should include video and audio communication features (n=2), or visual presentation features (n=1). These suggestions reflected that there were some students who were not very enthusiastic towards text-based asynchronous communication.

A few comments were classified into the "Others" category, as they were not relevant to the use of the discussion board.

4.3.2 Explanatory power of the CoI model

The second research question of the present study is "Can the CoI model, in which the three types of presence perceived are independent variables, help us to understand students' participation, perceived attainment, and satisfaction in online conferencing?". In answering the question, the relations of each of the three presences and students' participation, satisfaction and perceived attainment were examined by Pearson product-moment correlation coefficients (2-tailed) and one-way ANOVA test. For the

ANOVA tests, respondents were divided into three groups according to each of their overall perceived presences. Average numbers of messages posted and read, mean scores of satisfaction scale and perceived attainment scales of the three groups were then compared by ANOVA, with a post-hoc test.

Referring to this research question, 9 hypotheses ($H_7 - H_{15}$) are established and listed in chapter 3. The result of the data analyses is presented in the following sections accordingly.

H_7: Students reporting higher perceived teaching presence will have higher participation in online conference.

Following the discussion in the earlier section (2.3.1), participation in the conference is divided into productive participation and receptive participation. Productive participation is represented by number of messages posted and receptive participation by number of messages read.

Pearson product-moment correlation analysis showed that there was no significant correlation between perceived teaching presence and productive participation (r= −0.081, n=162, p=0.305).

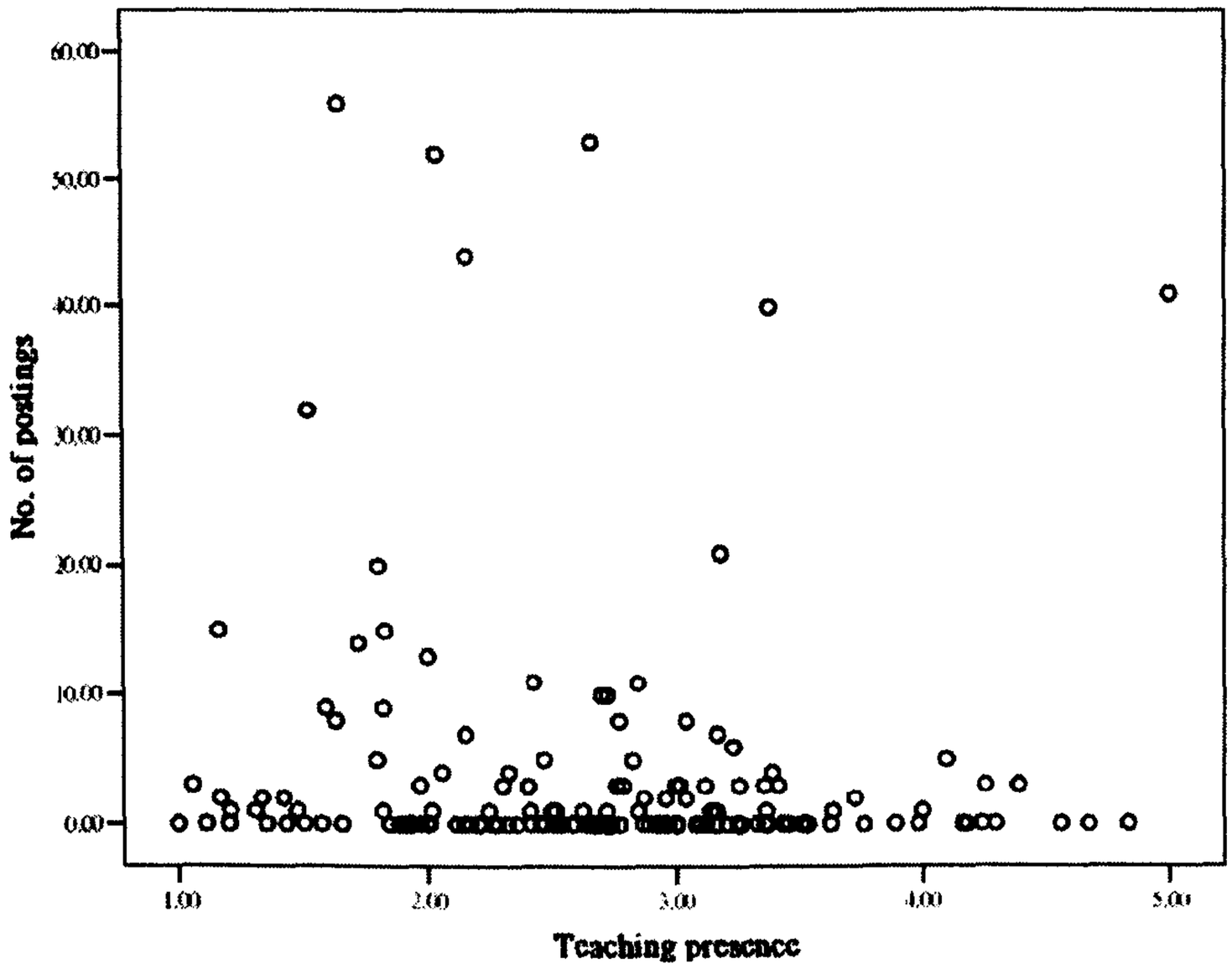


Figure 4.1 Scatterplot: No. of postings vs. teaching presence

The scatterplot above shows that a majority of the respondents did not post any messages in the conference, regardless of their teaching presence perceived. Most of the respondents who had actually participated in posting messages posted less than 10 messages in the whole period. A dozen of the respondents were active participants and they had different level of teaching presence perceived.

One-way between groups ANOVA was also conducted to explore the impact of teaching presence (TP) on productive participation, as measured by the number of messages posted. Subjects were divided into three groups according to their overall teaching presence scores. Respondents with TP score equal to or less than 2.3 were put in the low TP group. Respondents with TP score over 2.3 and less than or equal to 3.6 were in the mid TP group. Those respondents who had TP score higher than 3.6 were in the high TP group.

Table 4.13 ANOVA - No. of postings with teaching presence among groups

Group type	N	Mean	s.d.	F	Sig.
Low TP	52	6.17	12.82	2.146	0.120
Mid TP	91	2.74	7.47		
High TP	19	3.11	9.30		
Total	162	3.88	9.77		

ANOVA shows that there was no significant difference at a 0.05 level in the numbers of postings for the three groups [$F(2, 159)=2.146$, $p=0.120$].

As shown in Table 4.13, the average number of postings in the low TP group was unexpectedly high ($\bar{x}=6.17$), when compared with the mid and high TP groups, whose average numbers of posting were 2.74 and 3.11 respectively. However, the high standard deviation ($s.d.=12.82$) suggested that the numbers of messages posted in the group varied a lot. Reviewing the raw data set, it was found that there were a few extremely active respondents in the low TP group. The three most active respondents had posted 56, 52 and 44 messages respectively in the period.

When looking at the relationship between perceived teaching presence and the number of messages read, correlation analysis did not show significant correlation between perceived teaching presence and receptive participation ($r=0.098$, $n=162$, $p=0.217$).

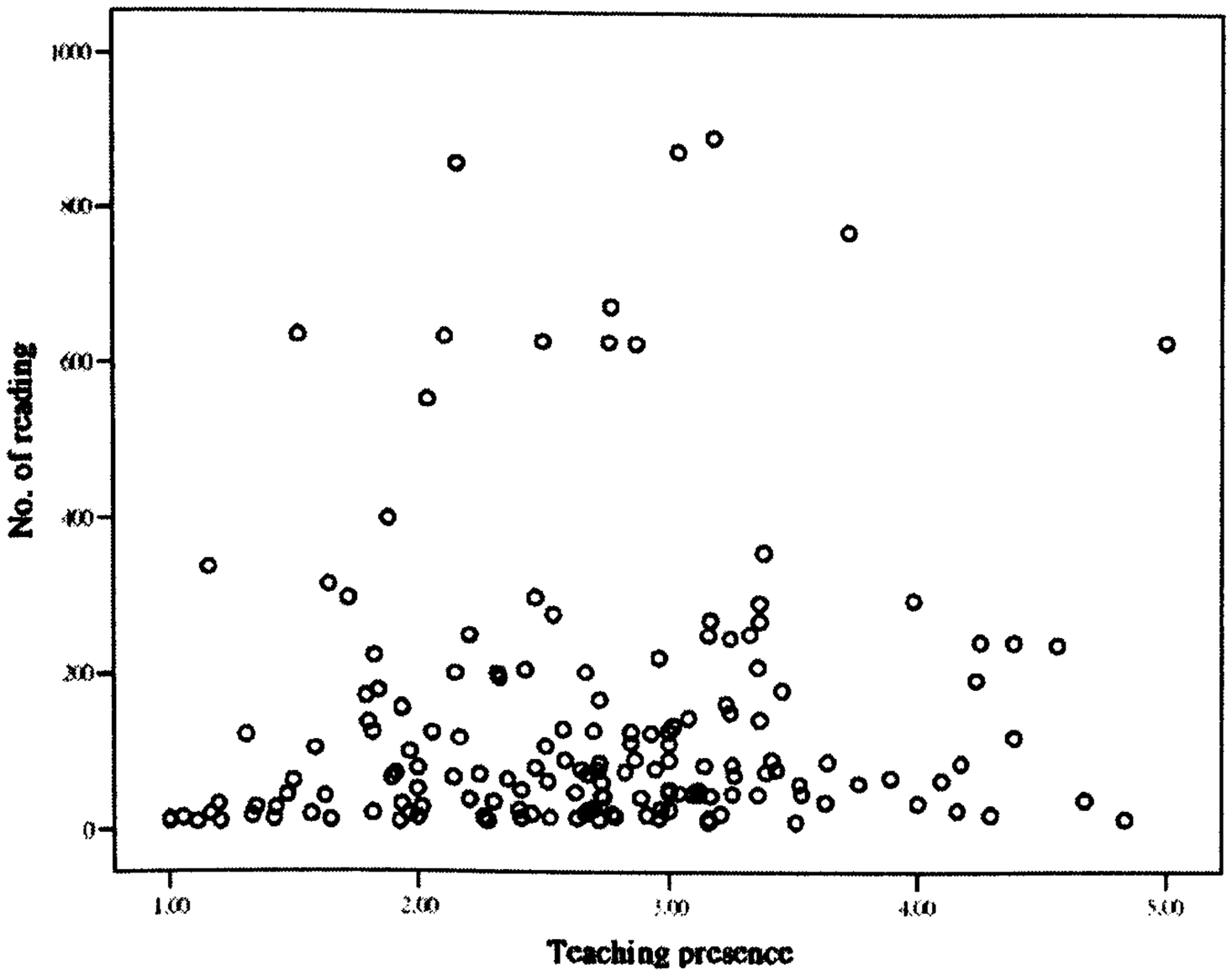


Figure 4.2 Scatterplot: No. of readings vs. teaching presence

The scatterplot shows that the respondents participated much more actively in reading conference messages, but the numbers of readings for most of the respondents were at a comparatively low level. The active participants, however, read more than 600 messages in the same period of time. However, there is no clear pattern on the perceived teaching presence of the active readers.

Table 4.14 ANOVA - No. of readings with teaching presence among groups

Group type	N	Mean	s.d.	F	Sig.
Low TP	52	134.79	184.83	0.288	0.750
Mid TP	91	140.04	176.98		
High TP	19	171.26	207.31		
Total	162	142.02	182.36		

Likewise, ANOVA showed no significant difference at a 0.05 level on the three groups of respondents [$F(2, 159)=0.288$, $p=0.750$].

According to the above correlation tests and ANOVA tests on the numbers of messages posted and read among the respondents with different levels of perceived teaching presence, the perceived teaching presence showed no effect on students' productive and receptive participation on online conference. Therefore, it was concluded that students reporting higher perceived teaching presence showed neither higher productive nor higher receptive participation in the online conference.

The result seems not to agree with the a previous study in the OUHK which reports that tutors' participation, in terms of the number of messages posted, is positively correlated with students' participation, in terms of students' logins and number of messages posted ($r= 0.762$ and 0.782 respectively, $p< 0.01$)(Tsang et al. 2002). However, as tutors' participation rate was not recorded and tutors' messages were not analyzed in the present study, the assumption that low perceived teaching presence was due to low participation of tutors might need further clarifications. In fact, students' responses in the open-ended questions revealed that some tutors used the online conference mainly as a platform for questions and answers, or a channel of delivery of materials. Tutor's participation like these might not provide much teaching presence, but students might be more enthusiastic in participating to the conferences.

H_8: *Students reporting higher perceived teaching presence will have higher perceived attainment through online conference.*

The second hypothesis to be tested was about the effect of teaching presence on students' perceived attainment through the communication tool. Correlation analysis showed that there was a significant positive relationship between perceived teaching presence and perceived attainment ($r=0.459$, $n=162$, $p=0.000$).

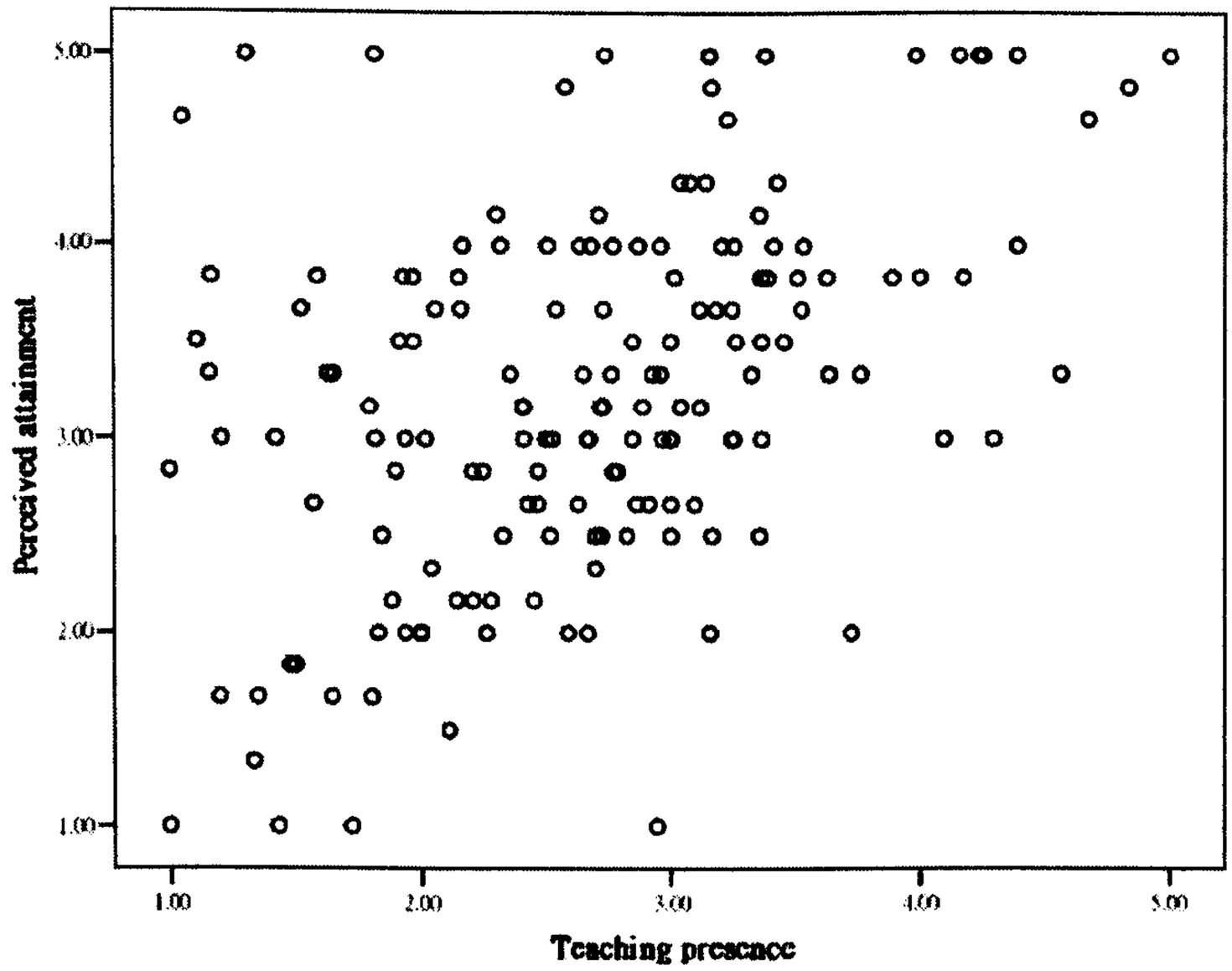


Figure 4.3 Scatterplot: Perceived attainment vs. teaching presence

Scatterplot shows a clear positive relationship between teaching presence and perceived attainment, but the relationship between the two variables is not very strong. Some respondents perceiving low teaching presence reported very high perceived attainment.

One-way ANOVA test showed that there was significant difference at 0.01 level on the attainment scores among the students with different level of perceived teaching presence [$F(2, 159)=17.208$, $p=0.000$].

Table 4.15 ANOVA - Perceived attainment with teaching presence among groups

Group type	N	Mean	s.d.	F	Sig.
Low TP	52	2.75	1.00	17.208	0.000**
Mid TP	91	3.36	0.78		
High TP	19	4.04	0.90		
Total	162	3.25	0.95		

** $p<0.01$

Post-hoc comparisons showed that the perceived attainment of high TP group was significantly higher than the low and mid TP groups at 0.01 level. The mean scores of the three groups ranged from 2.75 to 4.04, and the difference between the low TP group and high TP group was as high as 1.29. Effect size in ANOVA, which describes the "amount of the total variance in the dependents variable that is predictable from knowledge of the levels of the independent variable" (Tabachnick & Fidell 1996: 53), was indicated by an eta squared (η^2) of 0.178. Pallant (2001) suggests an eta squared higher than 0.14 is considered as showing a large effect.

It was concluded that students reporting higher perceived teaching presence had significantly higher perceived attainment in the use of online conference. This probably reflects that teaching presence, which includes elements like tutors' instructional design and organization, facilitating discourse and direct instruction, is beneficial to students' learning in an online conference.

H_9: *Students reporting higher perceived teaching presence will have higher satisfaction towards online conference as a learning tool.*

Correlation analysis showed a significant positive but weak relationship between perceived teaching presence and students' satisfaction (r=0.274, n=162, p=0.000).

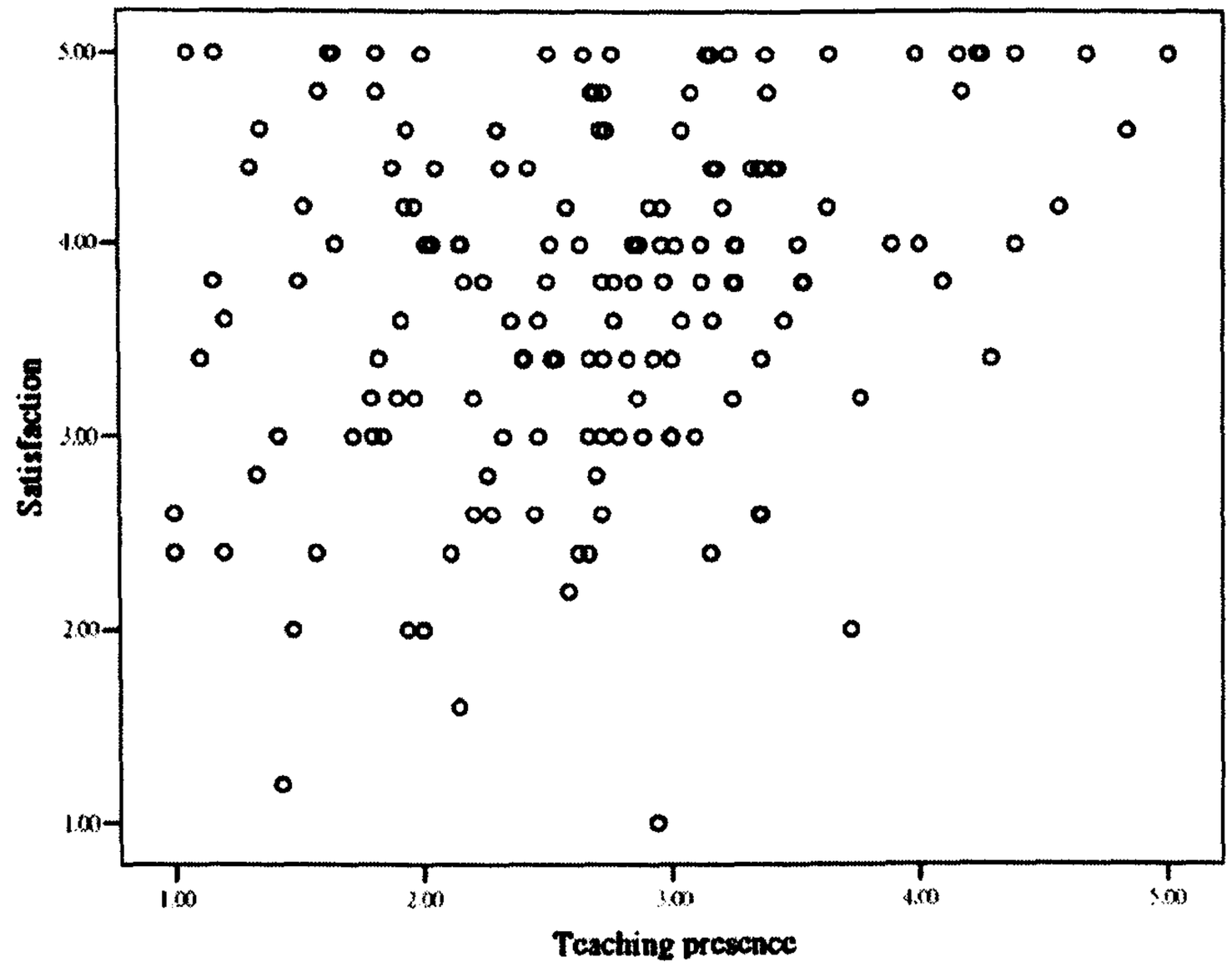


Figure 4.4 Scatterplot: Satisfaction vs. teaching presence

Scatterplot shows a clear positive relationship between teaching presence and satisfaction. Similar to the scatterplot with teaching presence and perceived attainment (See Fig. 4.3), the relationship between the two variables is not very strong. Some respondents perceiving low teaching presence reported very high satisfaction.

Table 4.16 ANOVA - Satisfaction with teaching presence among groups

Group type	N	Mean	s.d.	F	Sig.
Low TP	52	3.51	1.01	6.146	0.003**
Mid TP	91	3.76	0.79		
High TP	19	4.33	0.82		
Total	162	3.74	0.90		

** $p<0.01$

The effect of teaching presence on students' satisfaction towards the use of online conference was also explored by ANOVA. It was shown in Table 4.16 that there was significant difference at 0.01 level in the satisfaction scores among the three groups of respondents [$F(2,159)=6.146$, $p=0.003$]. Eta squared value was found to be 0.072,

which reflected a "medium effect" (Pallant 2001:192) of teaching presence on students' satisfaction.

Post-hoc comparisons by Tukey HSD test showed that respondents in the high TP group had significantly different satisfaction scores to respondents in the low TP group (p=0.002) and mid TP group (p=0.028). The low TP and mid TP groups, however, did not show significant difference in the satisfaction scores (p=0.233).

It was concluded that students reporting higher perceived teaching presence had significantly higher satisfaction in the use of online conference. In viewing the fact that teaching presence has significant correlations with both perceived attainment and satisfaction, it is therefore an possible factor that influences the students' experience online

H_{10}: *Students reporting higher perceived social presence will have higher participation in online conference.*

For the relationship between perceived social presence and students' participation in the conferencing, correlation analyses were conducted. There were weak positive correlations between social presence and productive participation (r=0.175, n=162, p=0.026). Similar weak correlation was also observed between social presence and receptive participation (r=0.171, n=162, p=0.03).

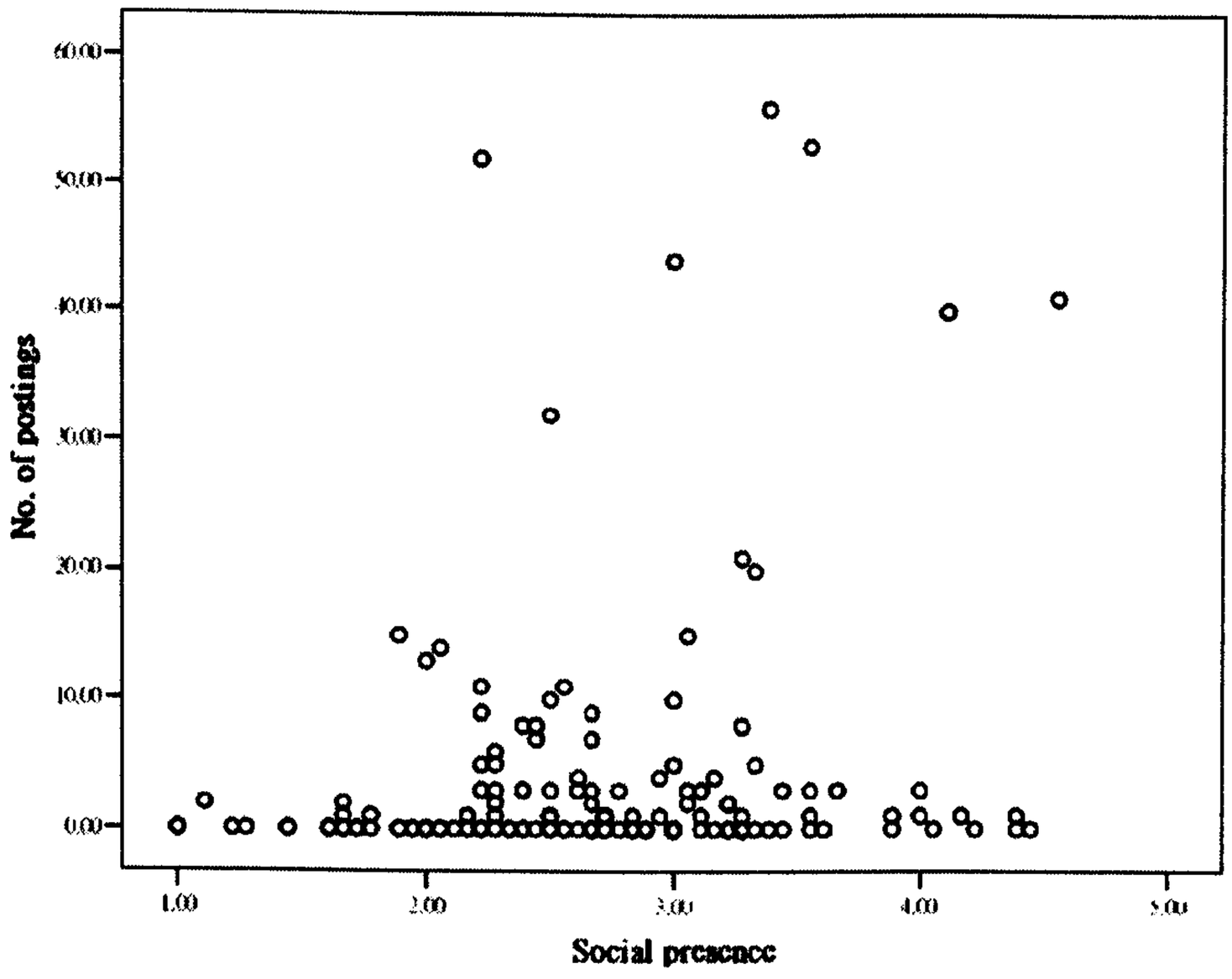


Figure 4.5 Scatterplot: No. of postings vs. social presence

The scatterplot shows that there is no clear correlation between the social presence and productive participation. However, almost all the respondents with scores of perceived social presence lower than 2 did not actively participate in the online conference. A certain minimum level of social presence might be required for more active participation.

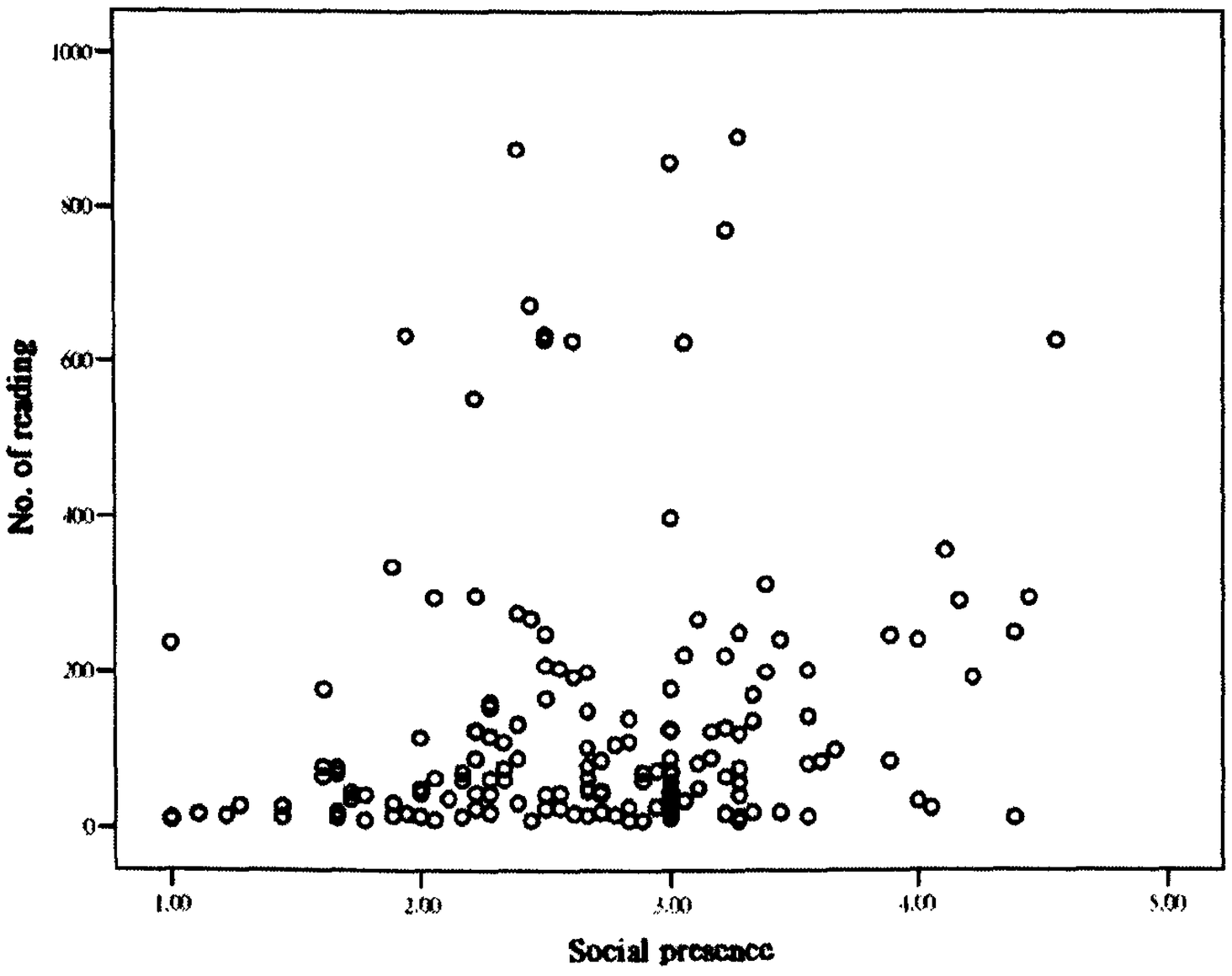


Figure 4.6 Scatterplot: No. of readings vs. social presence

According to the scatterplot, no clear relation between social presence and receptive participation is shown. Again, respondents with very low social presence did not participate equally actively as those with higher social presence. Similar to the productive participation, students' receptive participation may require a threshold level of social presence. Further investigation of this is needed.

Table 4.17 ANOVA - No. of posting with social presence among groups

Group type	N	Mean	s.d.	F	Sig.
Low SP	49	2.98	8.14	0.712	0.492
Mid SP	99	3.96	9.76		
High SP	14	6.50	14.44		
Total	162	3.88	9.77		

Follow-up ANOVA tests indicated that there was no statistically significant difference at 0.05 level in the number of postings among the three groups of respondents with different levels of perceived social presence [$F(2, 158)=0.712$, $p=0.492$].

For the number of messages read, i.e., receptive participation, ANOVA also showed no significant difference among the three groups for perceived social presence [$F(2, 159)=2.632$, $p=0.075$].

Table 4.18 ANOVA - No. of reading with social presence among groups

Group type	N	Mean	s.d.	F	Sig.
Low SP	49	96.78	130.15	2.632	0.075
Mid SP	99	155.74	202.28		
High SP	14	203.36	166.26		
Total	162	142.02	182.36		

It was, therefore, concluded that students reporting higher perceived social presence did not have higher productive or receptive participation in online conferencing. It is consistent with earlier studies (Tu 2000, Swan & Shih 2005) on the effect of social presence on students' participation, though the notion of social presence was defined in similar but different manners. These results reflected that students in the OUHK did not participate in online conference simply for closeness or connectedness among fellow students.

H_{11}: *Students reporting higher perceived social presence will have higher perceived attainment through online conference.*

Relationship between social presence and students' perceived attainment through the communication tool was first investigated by correlation analysis. It was reported that there was a significant positive relationship between perceived social presence and

perceived attainment (r=0.477, n=162, p=0.000).

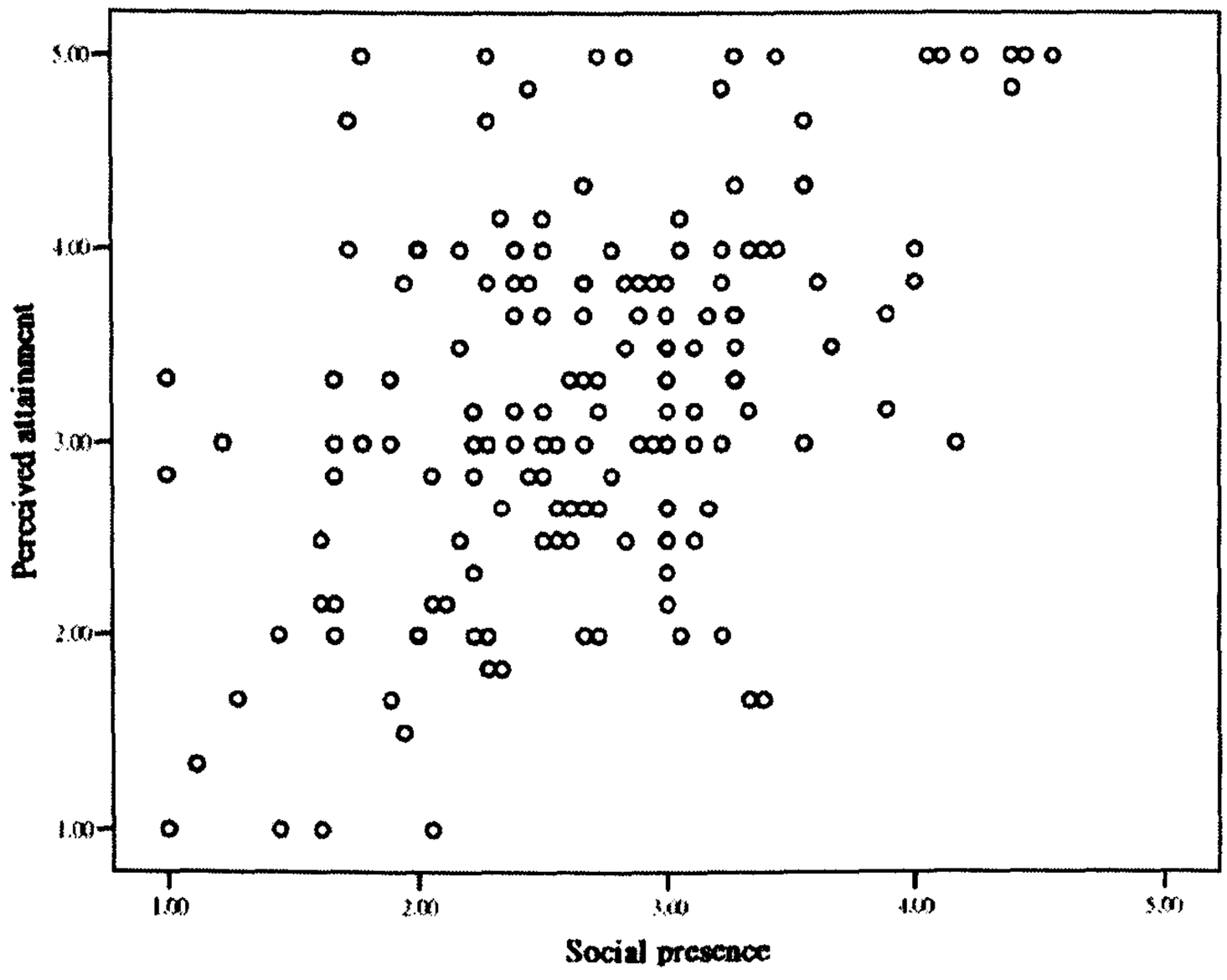


Figure 4.7 Scatterplot: Perceived attainment vs. social presence

Scatterplot of social presence and perceived attainment also clearly shows a positive correlation between the two variables.

One-way ANOVA was also conducted to explore the impact of perceived social presence on students' perceived attainment. There was significant difference at 0.01 level in the perceived attainment scores between the three groups of respondents with different level of perceived social presence [F(2, 159)=18.361, p=0.000]. The effect size, calculated by eta squared, was 0.188, which showed that there was a "large effect" (Pallant 2001: 192) of the social presence on perceived attainment.

Table 4.19 ANOVA - Perceived attainment with social presence among groups

Group type	N	Mean	s.d.	F	Sig.
Low SP	49	2.76	1.05	18.361	0.000**
Mid SP	99	3.34	0.77		
High SP	14	4.27	0.77		
Total	162	3.2469	0.9520		

** $p<0.01$

Post-hoc comparisons with Tukey HSD test indicated that the mean scores of any two of the three groups were significantly difference at 0.01 level. The mean difference of the perceived attainment score between low SP group and high SP group was as high as 1.52 (p=0.000). Therefore, it was concluded that students reporting a higher perceived social presence perceived a higher attainment by online conferencing.

Previous quantitative studies regarding social presence focused on satisfaction (Gunawardena & Zittle 1997, Tu 2000, Richardson & Swan 2003, Swan & Shih 2005), but the positive correlation of social presence on perceived attainment have not yet been established. This is one of the earliest empirical studies to confirm the relationship.

H_{12}: *Students reporting higher perceived social presence will have higher satisfaction towards online conference as a learning tool.*

The correlation between perceived social presence and students' satisfaction towards the use of online conference was found to be positive and significant (r=0.370, n=162, p=0.000). the scatterplot of the two variables is shown below.

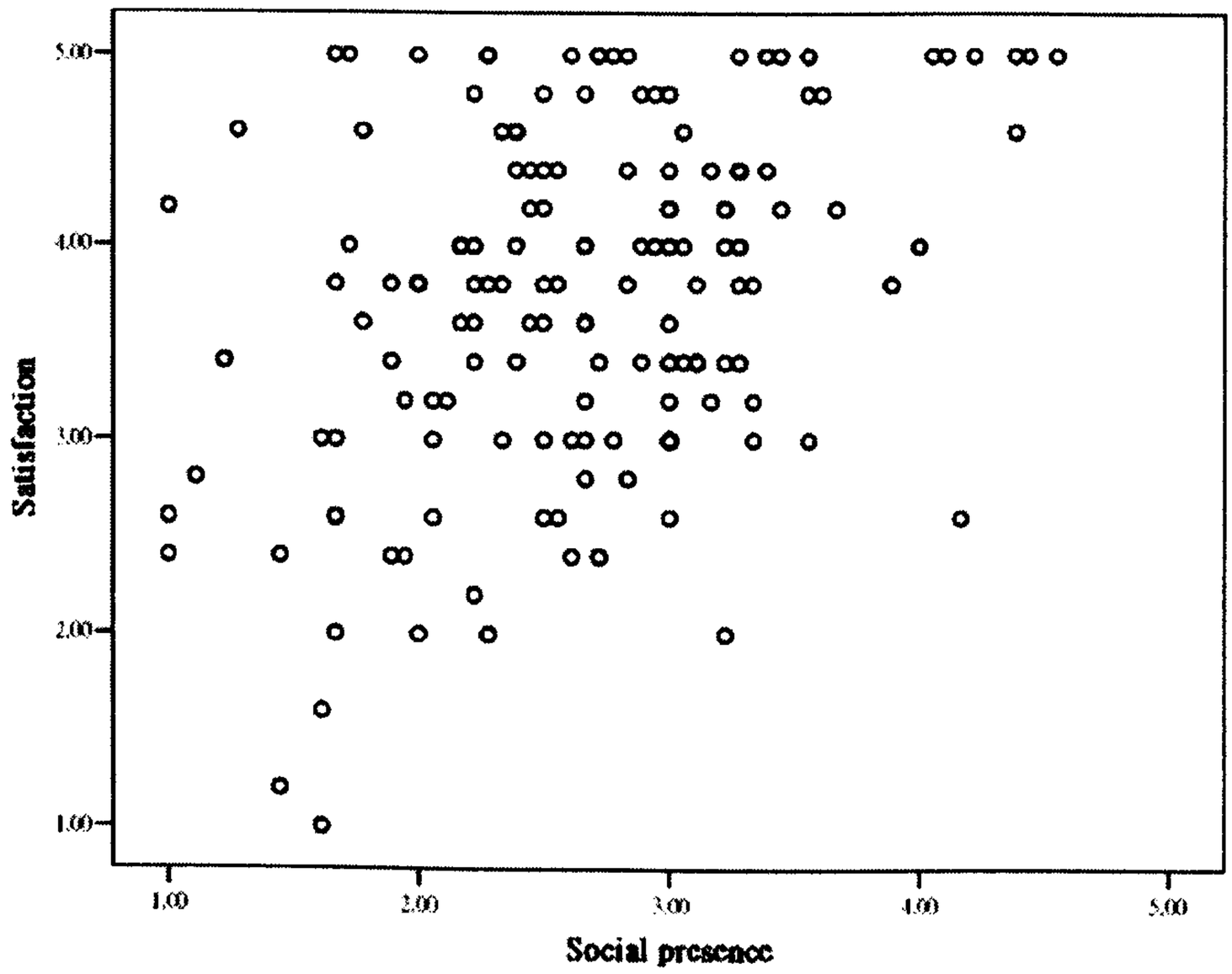


Figure 4.8 Scatterplot: Satisfaction vs. social presence

One-way ANOVA was also conducted. There was significant difference at 0.01 level in the students' satisfaction scores between the three groups of respondents with different level of perceived social presence [$F(2, 159)=9.741$, $p=0.000$]. Eta squared was 0.109 and it indicated a medium-high effect (Pallant 2001) of the social presence on satisfaction.

Table 4.20 ANOVA - Satisfaction with social presence among groups

Group type	N	Mean	s.d.	F	Sig.
Low SP	49	3.36	1.06	9.741	0.000**
Mid SP	99	3.84	0.76		
High SP	14	4.41	0.72		
Total	162	3.74	0.90		

** $p<0.01$

Post-hoc comparisons using Tukey HSD test showed that the mean scores of any two of the three groups were significantly different at 0.05 level ($p=0.000$). The mean difference of the satisfaction score between low SP group and high SP group was as

high as 1.05 (p=0.000). Therefore, it was concluded that students reporting higher perceived social presence had higher satisfaction towards online conference.

Some earlier studies of social presence give similar result, i.e., positive effect on satisfaction (Gunawardena & Zittle 1997, Tu 2000). Once again, it should be noticed that the notion of social presence was defined differently in the previous studies. This is probably one of the first few quantitative empirical studies showing that the social presence in CoI model significantly correlated with students' satisfaction when using online conference.

H_{13}: *Students reporting higher perceived cognitive presence will have higher participation in online conference.*

To test the hypotheses regarding cognitive presence, correlations analysis and ANOVA were both employed.

Correlations analysis did not show significant correlation between perceived cognitive presence and number of messages posted (r=0.036, n=162, p=0.645), while a weak yet significant positive correlation was found between cognitive presence and productive participation (r=0.164, n=162, p=0.036). (See Figure 4.9 and 4.10 respectively)

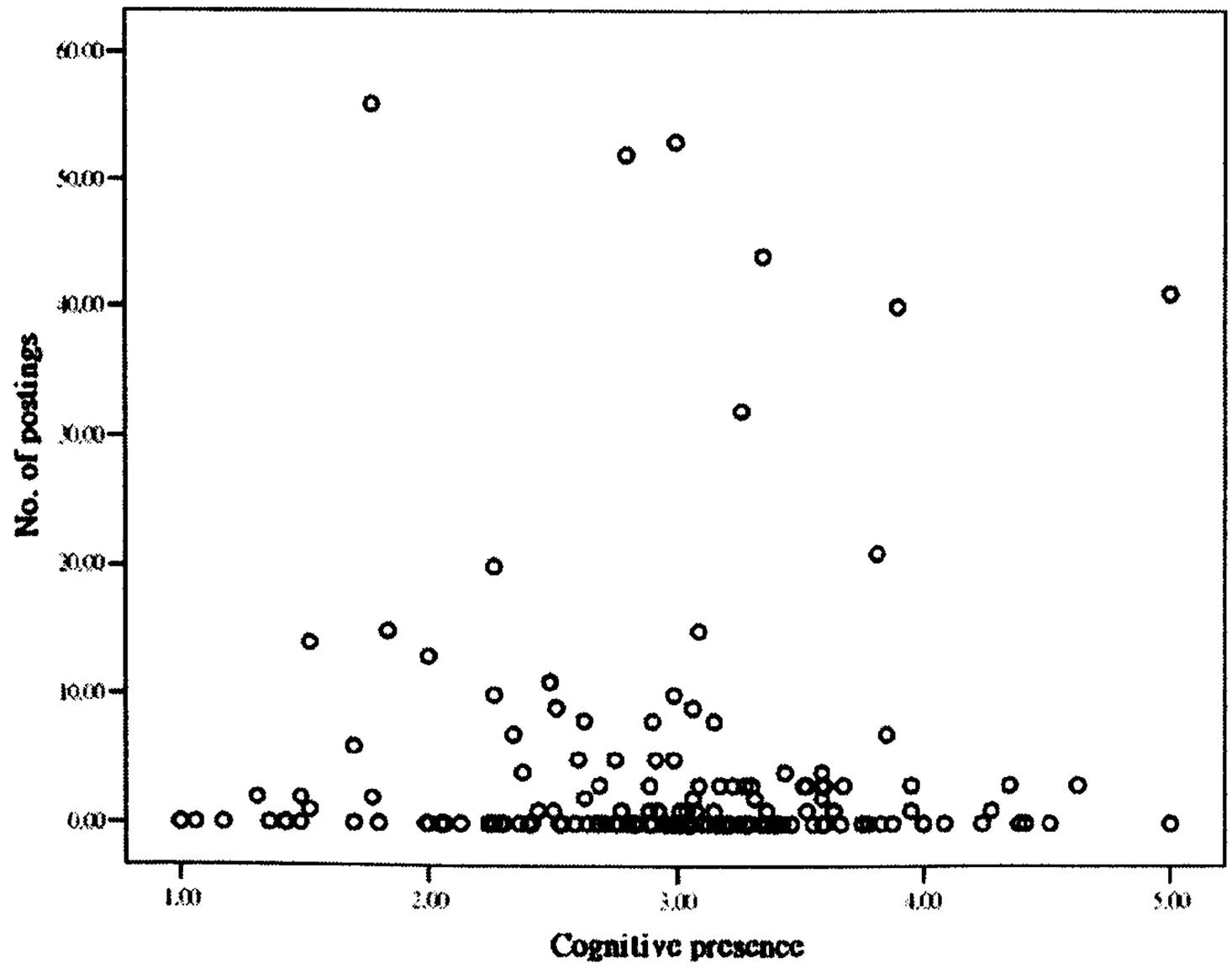


Figure 4.9 Scatterplot: No. of postings vs. cognitive presence

The scatterplot in Figure 4.9 illustrates the lack of a clear relation ship between cognitive presence and productive participation.

The scatterplot in Figure 4.10 below reveals that there is a weak relationship between cognitive presence and receptive participation. It is found that all the active respondents in reading messages had a comparatively high perceived cognitive presence. However, the correlation of the two variables was low, and the relationship between them has not been firmly established.

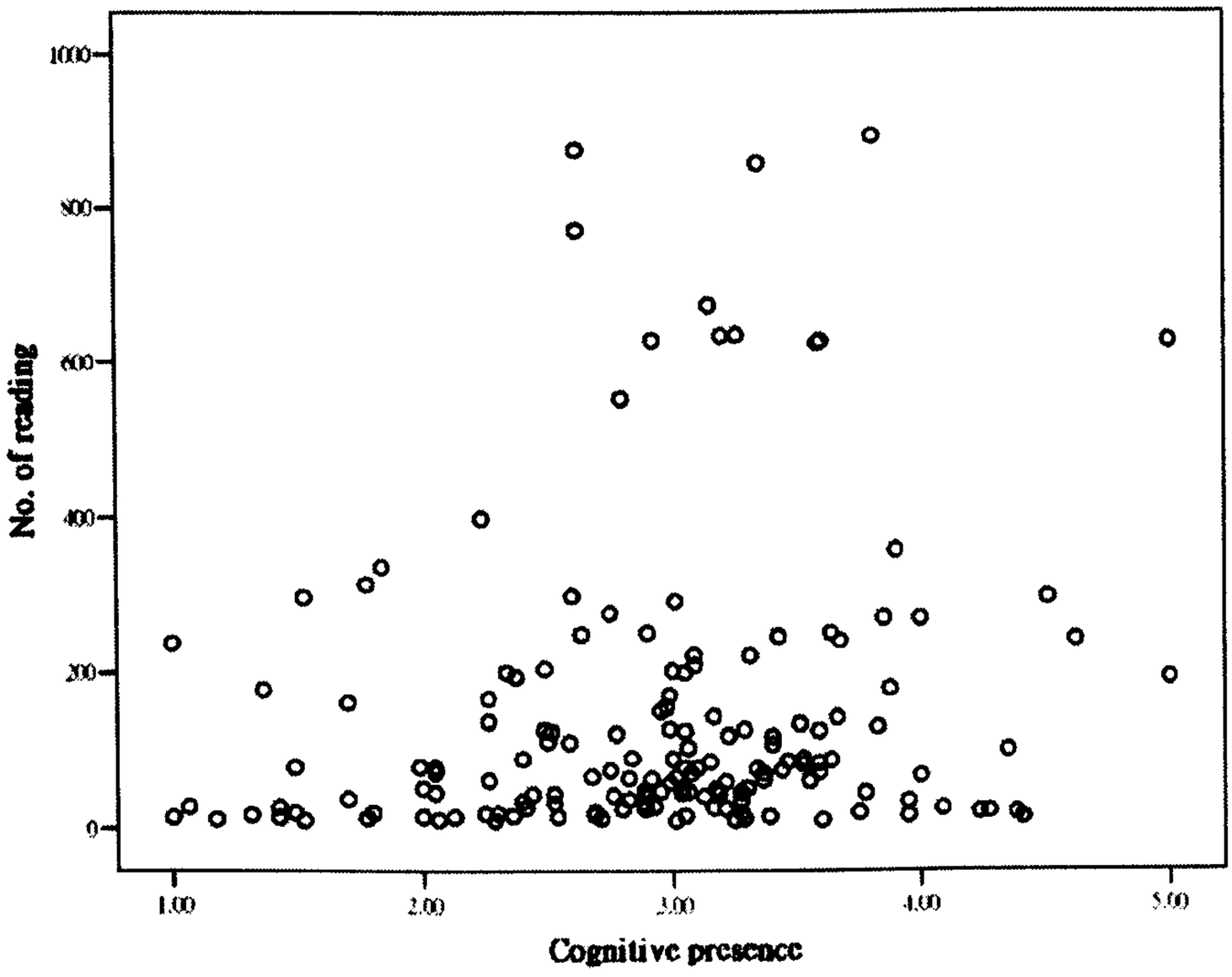


Figure 4.10 Scatterplot: No. of reading vs. cognitive presence

However, in the ANOVA tests conducted, students' different levels of overall perceived cognitive presence were not significantly associated with either the number of messages they posted [$F(2, 159)=0.195, p=0.823$] or the number of messages they read [$F(2, 159)=2.377, p=0.096$]. (Table 4.21 and Table 4.22)

Table 4.21 ANOVA - No. of postings with cognitive presence among groups

Group type	N	Mean	s.d.	F	Sig.
Low CP	33	4.27	10.71	0.195	0.823
Mid CP	102	3.53	9.14		
High CP	27	4.74	11.12		
Total	162	3.88	9.77		

Table 4.22 ANOVA - No. of readings with cognitive presence among groups

Group type	N	Mean	s.d.	F	Sig.
Low CP	33	90.94	109.99	2.377	0.096
Mid CP	102	145.24	187.59		
High CP	27	192.30	219.90		
Total	162	142.02	182.36		

When comparing the average numbers of messages read among the three groups in Table 4.22, it is shown that respondents reporting higher perceived cognitive presence read much more frequently than those reporting lower cognitive presence. This might be due to the great variations among respondents in the same group, as shown by the high standard deviations. Nevertheless, it is concluded that students reporting higher perceived cognitive presence did not show significantly higher participation in the online conference.

In this section, the hypothesis testing of H_7, H_{10}, and H_{13} shows that all the three elements of CoI model have no significant correlation with students' participation. Cognitive presence has been shown to have some association with receptive participation in online conference, but it is not a statistically significant relationship.

As mentioned earlier, a study in the OUHK context reveals that number of postings by tutors is highly correlated with the numbers of posting by students (Tsang et al. 2002), though the tutors' messages in the study were not further classified. Besides the three presences in the CoI model, there might be other factors effecting students' participation. If so, the extra element(s) might also be worth including in the CoI model. Further investigation on the issue of participation in online conference is then inevitable.

H_{14}: Students reporting higher perceived cognitive presence will have higher perceived attainment through online conference.

The relationship between perceived cognitive presence and perceived attainment was first investigated by correlation coefficient. A strong, positive correlation between the two variables was found (r=0.604, n=162, p=0.000). The scatterplot of the two variables is shown below.

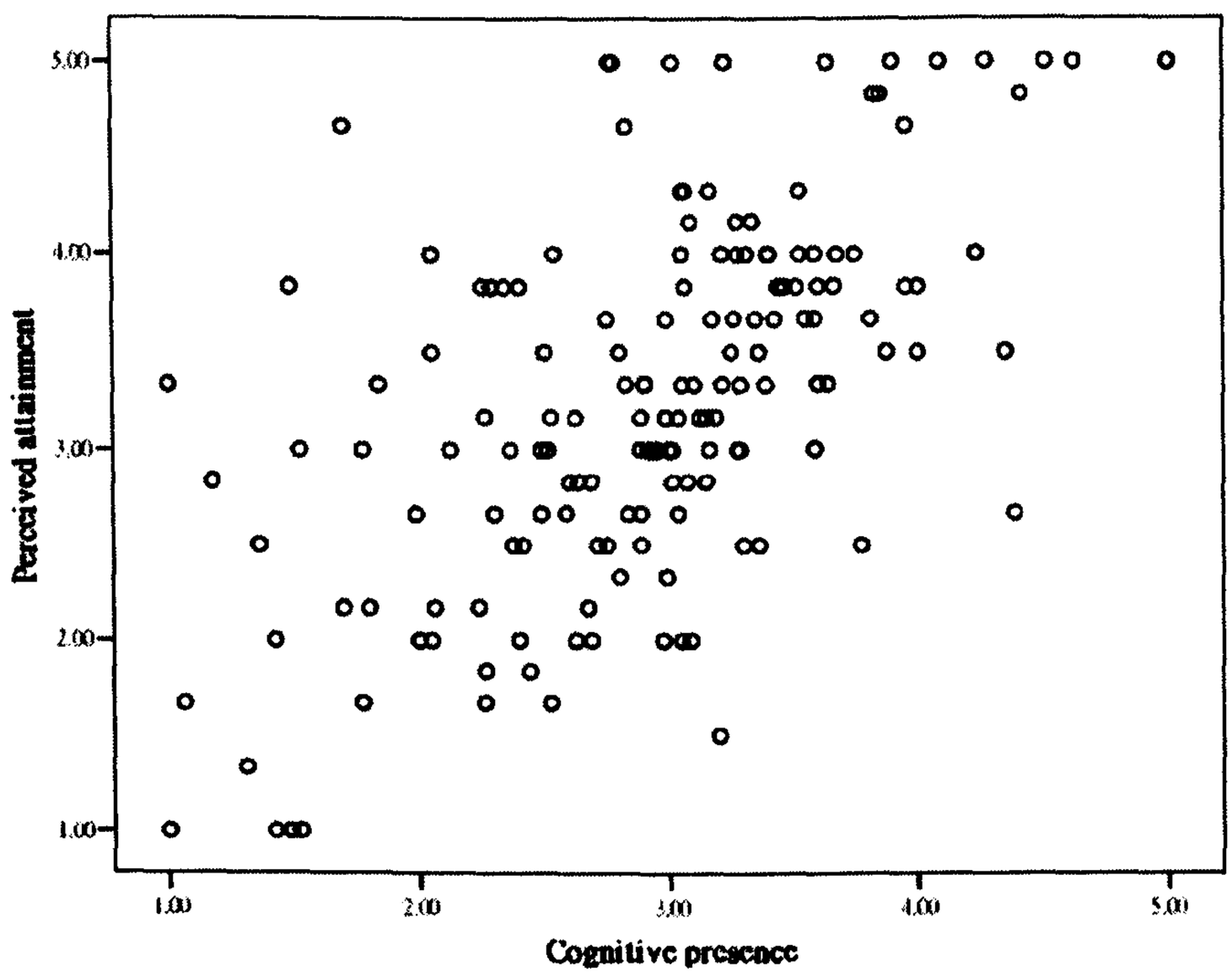


Figure 4.11 Scatterplot: Perceived attainment vs. cognitive presence

An ANOVA test was then conducted to compare the perceived attainment scores of respondents with various level of perceived cognitive presence. There was a statistically significant difference at a 0.01 level in the perceived attainment among the three groups [F(2, 159)=32.143, p=0.000]. Eta squared was found to be 0.288, and it shows a very large effect of cognitive presence on students' perceived attainment.

Table 4.23 ANOVA - Perceived attainment with cognitive presence among groups

Group type	N	Mean	s.d.	F	Sig.
Low CP	33	2.48	0.97	32.143	0.000**
Mid CP	102	3.25	0.76		
High CP	27	4.17	0.78		
Total	162	3.25	0.95		

** $p<0.01$

Post-hoc comparisons with Tukey HSD test showed that the mean scores of the three groups were significantly different from each other, all at 0.01 level. Therefore, it was concluded that students reporting higher perceived cognitive presence had higher perceived attainment through online conference.

When compared with the effective sizes (in eta squared) of teaching and social presence, which are 0.178 and 0.188 respectively, the effect of cognitive presence (with eta squared 0.288) on perceived attainment is the highest.

H_{15}: *Students reporting higher perceived cognitive presence will have higher satisfaction towards online conference as a learning tool.*

Correlation analysis showed a significant positive relationship between perceived cognitive presence and students' satisfaction towards the use of online conference (r=0.448, n=162, p=0.000).

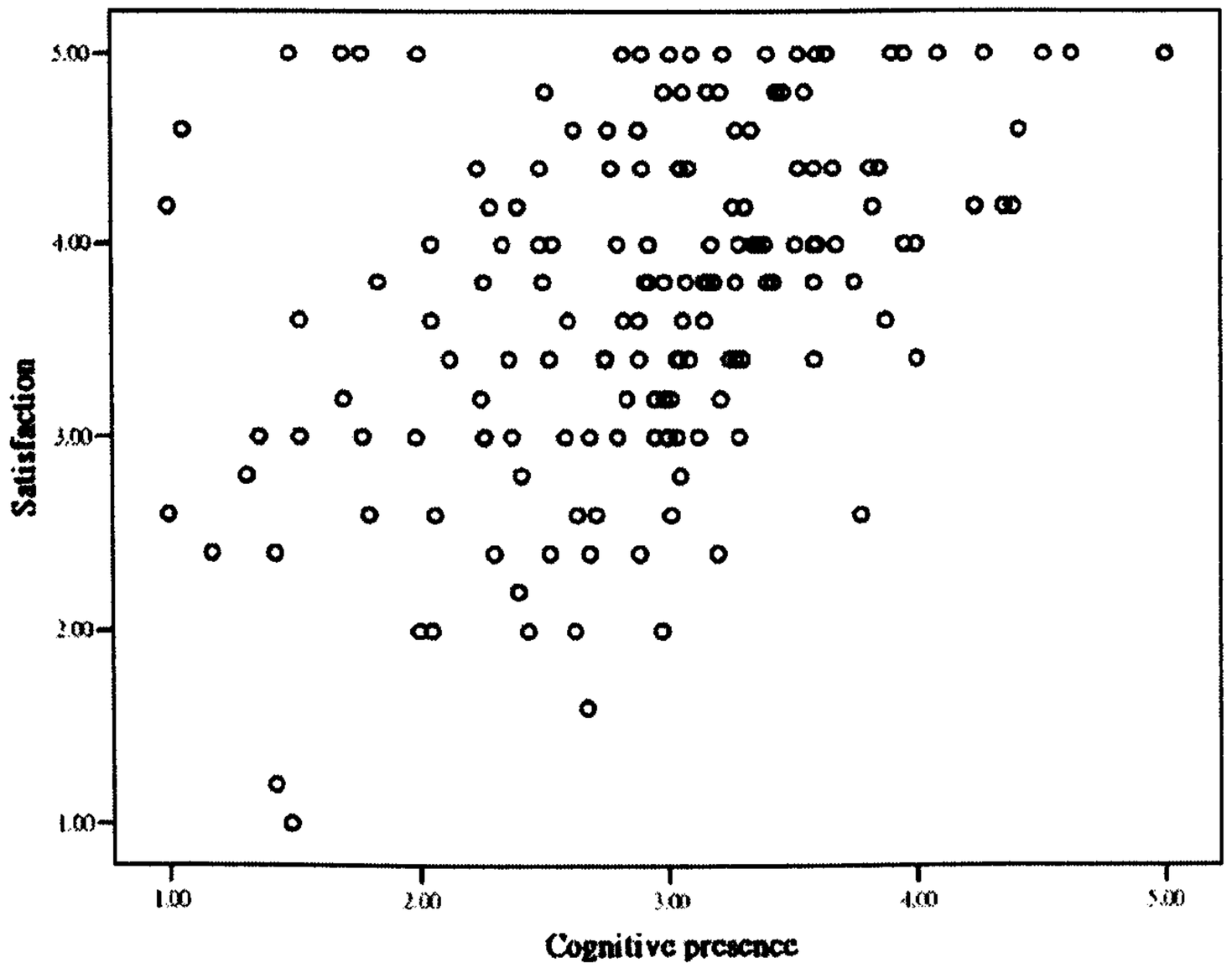


Figure 4.12 Scatterplot: Satisfaction vs. cognitive presence

Scatterplot of cognitive presence and satisfaction reflects that there is positive correlation between the two variables. However, a few respondents who have low perceived cognitive presence also reported high satisfaction. There might be factors on satisfaction other than cognitive presence.

ANOVA test conducted also showed that there was a statistically significant difference at 0.01 level [$F(2, 159)=13.783$, $p=0.000$] in the satisfaction scores for the three groups of students with different level of cognitive presence. Effect size, calculated by eta squared, was 0.148 which showed a large effect of cognitive presence on students' satisfaction.

Table 4.24 ANOVA - Satisfaction with cognitive presence among groups

Group type	N	Mean	s.d.	F	Sig.
Low CP	33	3.27	1.05	13.783	0.000**
Mid CP	102	3.72	0.81		
High CP	27	4.41	0.62		
Total	162	3.74	0.90		

** $p<0.01$

Post-hoc comparisons using Tukey HSD test indicated that the mean score of the low CP group was significantly differ from that of the mid CP group at a 0.05 level (p=0.023). The differences between low and high CP group (p=0.000) as well as mid and high CP group (p=0.001) were both at a 0.01 level. It was concluded that students reporting higher perceived cognitive presence had higher satisfaction towards the use of online conference.

To summarize the findings of the previous sections, the effect of the three presences on the dependent variables is shown in the following table.

Table 4. 25 Summary of the effect of various presences

Components of CoI model / Dependent Variables		Teaching presence	Social presence	Cognitive presence
Productive participation	r	-	0.175*	-
	η^2	-	-	-
Receptive participation	r	-	0.171*	0.164*
	η^2	-	-	-
Perceived attainment	r	0.459**	0.477**	0.604**
	η^2	0.178	0.188	0.288
Satisfaction	r	0.274**	0.370**	0.448**
	η^2	0.072	0.109	0.148

r – Pearson product-moment correlation coefficient (2-tailed)

η^2– Effect size of ANOVA (eta squared)

*p<0.05;

**p<0.01

Disregarding the small correlations between various presences on participations, it is clear that all the three presences in the CoI model have significant correlations with perceived attainment and satisfaction. The CoI model, therefore, can help us to have a better understanding of students' satisfaction and perceived attainment in the process of online conferencing, but the same model has no significant association with students' participation.

By simply comparing the correlations and effect sizes of ANOVA, it is revealed that cognitive presence has the greatest association among the three presences on both dependent variables. In order to further explore the relative effect of the three presences as predictor variables, a series of multiple regression analyses were conducted to identify the model that best predicts students' satisfaction, perceived attainment and participation towards the use of online conferencing, i.e., H_{16} to H_{18}.

However, as it is suggested by De Vaus (2002) and Pallant (2001), a number of assumptions should be met before the results of multiple regression can be taken seriously. Apart from the requirement of interval data (or above), which has been discussed in earlier section (3.4), issues such as sample size, multicollinearity, homoscedasticity, normality, linearity and outliers have also to be considered (De Vaus 2002 and Pallant 2001).

Assumptions of multiple regression

For sample size, Stevens (1996) suggests that for social science research, "about 15 subjects per predictor are needed for a reliable equation" (p.72). Tabachnick and Fidell (2007) give a more conservative formula for calculating sample size requirement, i.e., $N>50 + 8m$, where m is the number of predictors. There were three predictors in the present study (m=3), thus, a valid sample of 162 fulfilled the recommendation by Stevens and that by Tabachnick and Fidell (2007).

The second assumption of multiple regression is the absence of multicollinearity. Multicollinearity will become a problem when the predictors involved are highly inter-correlated, and it leads to "an unstable correlation matrix which is the core on which the main regression statistics are based" (De Vaus 2002: 343). Pallant (2001) suggests a correlation equal to or higher than 0.9 will be problematic and Licht (1995) suggests a criterion of 0.8, while Tabachnick and Fidell (2007) set a more conservative criterion of 0.7. A correlation matrix of the three perceived presences, however, showed that there were considerable and significant correlations among the three presences (Table 4.26). The correlation between social and cognitive presences was as high as 0.719.

Table 4.26 Correlation matrix of the three presences

		Cognitive presence	Social presence	Teaching presence
Cognitive presence	Pearson Correlation	1	0.719**	0.515**
	Sig. (2-tailed)		0.000	0.000
Social presence	Pearson Correlation	0.719**	1	0.429**
	Sig. (2-tailed)	0.000		0.000
Teaching presence	Pearson Correlation	0.515**	0.429**	1
	Sig. (2-tailed)	0.000	0.000	

**Correlation is significant at the 0.001 level (2-tailed)

A follow-up multicollinearity diagnostics were then conducted and the variable inflation factor (VIF) and tolerance measures were also computed. De Vaus (2002) states that a tolerance less than or equal to 0.2 or a VIF of 5 or more may violate the assumption. In the present analysis, all the values of tolerance and VIF fulfilled these criteria (see Table 4.27) and multicollinearity was not considered a threat to the analysis.

Table 4.27 Collinearity Statistics

	Collinearity Statistics	
	Tolerance	VIF
Cognitive presence	0.431	2.320
Social presence	0.479	2.089
Teaching presence	0.728	1.374

The Normal probability plot and residuals scatterplots of the regression standardized residuals of the various presences were also generated as part of the multiple regression procedure. Normal probability plots of students' perceived attainment and satisfaction were found to be a straight diagonal line from bottom left to top right (see Appendix 7a), and these suggested that there were no major deviation from normality

(Pallant 2001: 144). Scatterplots of the standardized residuals in attainment and satisfaction, however, were both found to be linear but slightly unevenly distributed (see Appendix 7b) which suggested the existence of heteroscedasticity. Heteroscedasticity is often due to skewness on the criterion variables, and transformation of the variables may reduce or eliminate heteroscedasticity (De Vaus 2002, Tabachnick & Fidell 2007). De Vaus (2002) suggests a log transformation may be applied to adjust moderate positive skew. However, transformations of the criterion variables, i.e. satisfaction and perceived attainment, did not give significant improvement as it was shown in the scatterplots of standardized residuals (see Appendix 7c).

Nevertheless, Tabachnick and Fidell (2007) reported that the existence of heteroscedasticity is not fatal to the analysis. It causes typically a lessening of power rather than an invalidation of the analysis (p.127). However, special attention had to be paid in interpreting and generalizing the result of multiple regression.

Since all the three presences did not show significant impact on students' productive and receptive participation, the issue of homoscedasticity of the two criterion variables were neglected.

Outliners were checked by inspecting the Mahalanobis distances that were produced by the multiple regression programme (Pallant 2001). With the use of a $p<0.001$ criterion for Mahalanbis distance no outliners among the cases were found, i.e., none of the values exceeded the critical value 16.27, as it is suggested by Tabachnick and Fidell (2007) for an analysis of three predictors ($d.f.=2$).

The data in the present study, therefore, generally meet the assumptions for multiple regression, except the heteroscedasticity identified. As the existence of heteroscedasticity is not fatal to multiple regression, it was conducted to test H_{16} –H_{18}.

H_{16} *The three perceived presences of CoI model are significant predictors of students' satisfaction towards online conferencing.*

There are different methods of multiple regression, and the methods used and the way in which the predictors are entered into the model can have a great impact on the result (Field 2000, De Vaus 2002). In hierarchical multiple regression, in which the researcher can specify the sequence of predictors entered, it is generally suggested that "predictors should be selected based on past research" (Field 2000: 119). However, as there is no previous study investigating the impact of various presences on students' perception of the use of online conference, the present researcher could have no theoretical guideline to determine the sequence of predictors entered in the model. Stepwise multiple regression was first conducted since it is more suitable for exploratory model building (Wright 1997).

A stepwise multiple regression was then conducted to explore the effect of the three presences on students' satisfaction, and the model summary is shown in Table 4.28.

Table 4.28 Stepwise regression of various presences on students' satisfaction-Model summary

Model	R	R^2	Adjusted R^2	Std. Error of the estimate	Change Statistics				
					R^2 change	F change	df1	df2	Sig. F change
1	0.448[a]	0.201	0.196	0.80721	0.201	40.185	1	160	0.000
Model 1 Predictors: (Constant), Cognitive presence									

Among the three presences of CoI model entered into the regression model, cognitive presence was determined as the only valid variable predicting students' satisfaction ($R^2 = 0.201$, $F(1, 160) = 40.185$, $p < 0.001$). The other two variables, i.e., social and teaching presences, had very low partial correlations (0.077 and 0.057) to students' satisfaction with the perceived cognitive presence being controlled.

However, earlier correlation analyses showed that teaching presence and social presence showed small (r=0.274, p=0.000) and moderate correlation (r=0.370, p=0.000) to students' satisfaction. The exclusion of the two presences might be due to the fact that the three presences share common variance with the criterion variable (De Vaus 2002).

A series of hierarchical multiple regression were then conducted so as to explore the relative contribution of the three presences. When cognitive presence was entered first in the model, it was the only significant predictor of students' satisfaction, explaining about 20% (R^2=0.201) of the variance in satisfaction. The other two presences did not make significant difference in R^2 (Table 4.29).

Table 4.29 Hierarchical regression of various presences on students' satisfaction-

Model summary I

Model	R	R^2	Adjusted R^2	Std. Error of the estimate	Change Statistics				
					R^2 change	F change	df1	df2	Sig. F change
1	0.448(a)	0.201	0.196	0.80721	0.201	40.185	1	160	0.000
2	0.453(b)	0.205	0.195	0.80735	0.005	0.942	1	159	0.333
3	0.455(c)	0.207	0.192	0.80891	0.002	0.388	1	158	0.534

a Predictors: (Constant), Cognitive presence

b Predictors: (Constant), Cognitive presence, Social presence

c Predictors: (Constant), Cognitive presence, Social presence, Teaching presence

However, when social presence was entered first, the scenario became very different (as shown in Table 4.30). Social presence became a major predictor and explained 13.7% of the variance in satisfaction (R^2=13.7, p=0.000), and cognitive presence explained an extra 6.9% of the variance.

Table 4.30 Hierarchical regression of various presences on students' satisfaction- Model summary II

Model	R	R^2	Adjusted R^2	Std. Error of the estimate	Change Statistics				
					R^2 change	F change	df1	df2	Sig. F change
1	0.370(a)	0.137	0.131	0.83892	0.137	25.338	1	160	0.000
2	0.453(b)	0.205	0.195	0.80735	0.069	13.755	1	159	0.000
3	0.455(c)	0.207	0.192	0.80891	0.002	0.388	1	158	0.534

a Predictors: (Constant), Social presence

b Predictors: (Constant), Social presence, Cognitive presence,

c Predictors: (Constant), Social presence, Cognitive presence, Teaching presence

When entered last into the model, teaching presence was shown not to be a valid predictor (R^2 change=0.002, p=0.534). However, as shown in Table 4.31 below, when teaching presence was entered first in a hierarchical regression, it explained more than 7% of the variance in satisfaction (R^2=0.075, p=0.000). Social presence and cognitive presence explained another 7.8% and 5.4% respectively.

Table 4.31 Hierarchical regression of various presences on students' satisfaction- Model summary III

Model	R	R^2	Adjusted R^2	Std. Error of the estimate	Change Statistics				
					R^2 change	F change	df1	df2	Sig. F change
1	0.274(a)	0.075	0.069	0.86830	0.075	13.007	1	160	0.000
2	0.391(b)	0.153	0.142	0.83354	0.078	14.623	1	159	0.000
3	0.455(c)	0.207	0.192	0.80891	0.054	10.829	1	158	0.001

a Predictors: (Constant), Teaching presence

b Predictors: (Constant), Teaching presence, Social presence

c Predictors: (Constant), Teaching presence, Social presence, Cognitive presence

Since social presence and teaching presence did not make significant difference to R^2 after cognitive presence was entered to the model (as shown in Table 4.29), the two presences are probably not unique predictors of the criterion variable. One possible explanation of the impact of the two presences on satisfaction is that they indirectly influence satisfaction via cognitive presence.

In fact, the responses of the open-ended question also show that cognitive presence and teaching presence received much more concern than social presence. While teaching presence showed a relatively small influence on satisfaction (R^2=0.075) even when it was entered first to the model, the importance of cognitive presence is supported by quantitative and qualitative measures. It is, therefore, justified to conclude that although all the three presences in the CoI model were significantly correlated to the students' satisfaction, only cognitive presence was a valid predictor of students' satisfaction in the use of online conference.

When Gunawardena and Zittle (1997) argued that social presence was a determining factor to students' satisfaction, they did not consider the construct of cognitive presence in the online conference. The data in the present study showed that social presence might only be an intervening variable between cognitive presence and satisfaction. However, the notion of social presence is defined differently in earlier studies, the actual effect of the social presence in Gunawardena and Zittle's definition may need further investigation.

H_{17} *The three perceived presences of CoI model are significant predictors of students' perceived attainment through online conferencing.*

Following the practice in the test of H_{16}, the predictor variables, i.e., perceived cognitive, social and teaching presences, were also first entered into a stepwise multiple regression model predicting students' perceived attainment. The information

of the analysis is summarized in Table 4.32.

Table 4.32 Stepwise regression of various presences on perceived attainment- Model summary

Model	R	R^2	Adjusted R^2	Std. Error of the estimate	Change Statistics				
					R^2 change	F change	df1	df2	Sig. F change
1	0.604	0.365	0.361	0.76074	0.365	92.11	1	160	0.000
2	0.628	0.395	0.387	0.74511	0.030	7.78	1	159	0.006
Model 1- Predictors: (Constant), Cognitive presence									
Model 2- Predictors: (Constant), Cognitive presence, Teaching presence									

Among the three presences of CoI model entered into the regression model, cognitive presence was determined as the most important variable predicting students' attainment, and 36.5% of the variance was explained ($R^2 = 0.365$, F (1, 160) = 92.11, $p = 0.000$). The other variable, i.e., teaching presence, contributed only an additional 3% to explain the variance of students' attainment (R^2 change= 0.030, F change (1, 159) = 7.782, $p = 0.006$). The excluded variable in stepwise regression, i.e., social presence, had a very low partial correlation (0.057) to perceived attainment with the other two variables being controlled. This result paralleled to the hierarchical regression with cognitive presence, teaching presence, and social presence entered accordingly (see Table 4.33). After cognitive presence and teaching presence, social presence was not an significant predictor to perceived attainment (R^2 change=0.002, p =0.477).

Table 4.33 Hierarchical regression of various presences on students' perceived attainment- Model summary I

Model	R	R^2	Adjusted R^2	Std. Error of the estimate	Change Statistics				
					R^2 change	F change	df1	df2	Sig. F change
1	0.604(a)	0.365	0.361	0.76074	0.365	92.110	1	160	0.000
2	0.628(b)	0.395	0.387	0.74511	0.030	7.782	1	159	0.006
3	0.630(c)	0.397	0.385	0.74626	0.002	0.508	1	158	0.477

a Predictors: (Constant), Cognitive presence

b Predictors: (Constant), Cognitive presence, Teaching presence

c Predictors: (Constant), Cognitive presence, Teaching presence, Social presence

However, when social presence was entered first in a hierarchical regression model, as shown in Table 4.34 below , it explained more than 22% of the variance in perceived attainment (R^2=0.227, p = 0.000). Cognitive presence contributed an additional 14.2% of the variance.

Table 4.34 Hierarchical regression of various presences on students' perceived attainment- Model summary II

Model	R	R^2	Adjusted R^2	Std. Error of the estimate	Change Statistics				
					R^2 change	F change	df1	df2	Sig. F change
1	0.477(a)	0.227	0.222	0.83941	0.227	47.068	1	160	0.000
2	0.608(b)	0.369	0.361	0.76090	0.142	35.722	1	159	0.000
3	0.630(c)	0.397	0.385	0.74626	0.028	7.296	1	158	0.008

a Predictors: (Constant), Social presence

b Predictors: (Constant), Social presence, Cognitive presence

c Predictors: (Constant), Social presence, Cognitive presence, Teaching presence,

The effect of teaching could not be ignored. As shown in Table 4.35 below, when teaching presence was entered first into the model, it explained as much as 21.1% of the variance (R^2=0.211, p=0.000). Subsequent predictor social presence contributed an

additional 9.6% (R^2 change=0.096, p=0.000), and the last predictor in the model, cognitive presence, explained another 9% of the variance (R^2 change=0.090, p=0.000).

Table 4.35 Hierarchical regression of various presences on students' perceived attainment- Model summary III

Model	R	R^2	Adjusted R^2	Std. Error of the estimate	Change Statistics				
					R^2 change	F change	df1	df2	Sig. F change
1	0.459(a)	0.211	0.206	0.84849	0.211	42.660	1	160	0.000
2	0.554(b)	0.307	0.298	0.79772	0.096	22.013	1	159	0.000
3	0.630(c)	0.397	0.385	0.74626	0.090	23.682	1	158	0.000

a Predictors: (Constant), Teaching presence

b Predictors: (Constant), Teaching presence, Social presence

c Predictors: (Constant), Teaching presence, Social presence, Cognitive presence,

Similar to that of satisfaction, cognitive presence was found to be the major unique predictor of perceived attainment, with 36.5% of variance explained. Although teaching presence shared quite some amount of variance with cognitive presence on perceived attainment, 3% of the variance was contributed solely by teaching presence. In view of the common variance among the three presences

To conclude, it was found that although all the three presences in the CoI model were significantly correlated to the students' perceived attainment, only cognitive presence and teaching presence were valid predictors of perceived attainment. Social presence might influence students' perceived attainment indirectly via cognitive presence.

H_{18} *The three perceived presences of CoI model are significant predictors of students' participation in online conferencing.*

Since there were no significant correlations between various presences and students'

productive and receptive participation in online conference, the three perceived presences of CoI model were not significant predictors of students' participation.

4.3.3 Relationship between various presences in the CoI model

The third research question is "What are the statistical correlations between students' perceptions of teaching, cognitive and social presences?" In answering the question, the present researcher started with a simple correlation analysis which could test H_{19}.

H_{19}: There are significant correlations among students' teaching, social and cognitive presences perceived.

The relationship between the three presences in the CoI model was investigated using the Pearson product-moment correlation coefficient. There were medium to strong positive correlations between the three variables.

Table 4.36 Correlations between various presences in CoI model

	Cognitive presence	Social presence	Teaching presence
Cognitive presence	1	0.719**	0.515**
Social presence		1	0.429**
Teaching presence			1

**Correlation is significant at the 0.005 level (2-tailed)

The analysis in the previous section revealed that cognitive presence was the major significant predictor to students' satisfaction towards online conference (R^2=0.365) and students' perceived attainment (R^2=0.201). Although social presence and teaching presence were both significantly correlated with students' satisfaction and attainment, they were found not contributing much to the criterion variables in the stepwise multiple regression model, as shown in the previous section (4.3.2). One possible explanation might be that these two presences were associated strongly with cognitive

presence and thus indirectly associated with students' satisfaction and attainment.

This hypothesis was tested by another multiple regression analysis, making cognitive presence the criterion variable. The model summary is shown below.

Table 4.37 Stepwise regression of social and teaching presences on cognitive presence-Model summary

Model	R	R^2	Adjusted R^2	Std. Error of the estimate	Change Statistics				
					R^2 change	F change	df1	df2	Sig. F change
1	0.719	0.517	0.514	0.54701	0.517	171.02	1	160	0.000
2	0.754	0.569	0.564	0.51819	0.052	19.29	1	159	0.000
Model 1: Predictors: (Constant), Social presence Model 2: Predictors: (Constant), Social presence, Teaching presence									

In the stepwise multiple regression, social presence was entered first and explained 51.7% of the variance in cognitive presence [$F(1, 160)=171.02, p < 0.0005$]. Teaching presence was entered second and explained a further 5.2% [$F(1, 159)=19.29, p < 0.0005$]. Greater cognitive presence was associated with greater social and teaching presence. Since social presence and teaching presence were also significantly correlated ($r=0.429, p<0.005$), they might share common variance on cognitive presence. A hierarchical regression with teaching presence entered first showed that teaching presence per se could explain 26.5% of the variance in cognitive presence.

Table 4.38 Hierarchical regression of teaching and social presences on cognitive presence-Model summary

Model	R	R^2	Adjusted R^2	Std. Error of the estimate	Change Statistics				
					R^2 change	F change	df1	df2	Sig. F change
1	0.515	0.265	0.261	0.67443	0.265	57.757	1	160	0.000
2	0.754	0.569	0.564	0.51819	0.304	112.03	1	159	0.000
Model 1: Predictors: (Constant), Teaching presence Model 2: Predictors: (Constant), Teaching presence, Social presence									

To summarize the findings in research questions 2 and 3, the following diagram may give a more holistic picture compassing all the major variables in the present study.

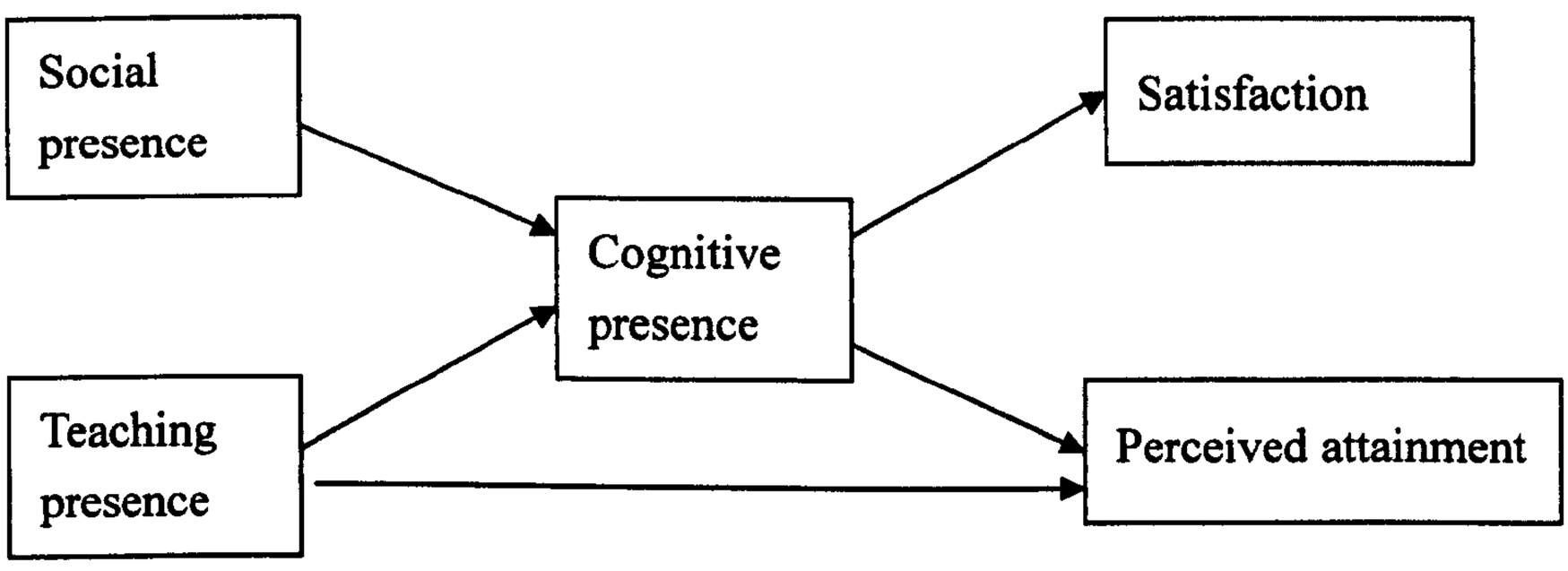


Figure 4.13 A proposed relationship between the major variables

The major findings of research questions 2 and 3 are shown below:

- None of the three presences in the CoI model showed notable or significant correlation with students' productive or receptive participation in online conferencing.

- As shown in Table 4.25, all the three presences had significant correlations with both satisfaction and perceived attainment of students.

- By comparing the effect sizes of a series of ANOVA, it was found that among the

three presences in the CoI model, cognitive presence showed the greatest effect on both students' satisfaction and perceived attainment.

- Multiple-regression analyses confirmed that cognitive presence was the dominating predictor of students' satisfaction. Social and teaching presences showed no additional effect in predicting students' satisfaction when cognitive presence had been considered.

- Cognitive presence was also found to be the major predictor of students' perceived attainment while teaching presence showed minor effect on the same criterion variable.

- By applying a series of hierarchical regressions, a model of the major variables in the present study was proposed (Fig. 4.13). It is shown in the model that cognitive presence is the major predictor of students' satisfaction and perceived attainment. The other two factors, social and teaching presences, exert their impact indirectly on the criterion variables, mediated by cognitive presence.

Prior to the present study, only the effect of social presence had been empirically studied, but the operationalizations of the concept "social presence" in the previous studies were different from that in the CoI model. The effect of teaching and cognitive presences of the CoI model had never been empirically examined. The present study, therefore, is a pioneer to explore the possible effect of the various presences on students' learning experience on online conferencing.

When compared with previous studies of social presence on participation (Tu 2000, Swan & Shih 2005) and satisfaction (Gunawardena & Zittle 1997, Tu 2000, Richardson & Swan 2003, Swan & Shih 2005), the findings in the present study, though in a different operationalization, is parallel to the previous studies.

The interrelationship of the three presences in the CoI model was also a new topic to explore. The present study adopted the tool of multiple regression to investigate the relationship among them, and the result has reaffirmed the claim given by Garrison et al (2000) and Garrison and Anderson (2003).

However, it is worth noticing that the correlation analyses as well as the multiple regression conducted are not adequate to establish a causal relationship between social presence, teaching presence and cognitive presence, but they provide some bases for such supposition. Further statistical analyses such as path analysis or structural equation modeling based on a more representative sample can be considered to further establish the relationship. As an exploratory empirical study of CoI model, the main focus of the present study rest on the explanatory power of the model. More sophisticated statistical analyses can be applied in order to formally establish a model of online conferencing, especially when the sample size and return rate are more favourable.

4.4 Conclusion

This chapter has just presented the analysis of data and answered all the three research questions. The data show that online conference, though it had been offered in OLE for some years, was not a popular communication tool among the students in the OUHK. Most of the respondents were not very active in posting messages in the discussion broad, and the average number of messages posted in a 6-month period was less than 4. One the other hand, the receptive participation on conference, in terms of number of messages read, was much higher. Each student read more than 140 messages in the same period of time. It reflects a situation where most of the students were not enthusiastic to make the online conference a platform for knowledge construction. Rather, as shown in the responses of the open-ended question, the conference was used

mainly as a platform for delivering course materials. According to the respondents, all the three presences in the CoI model were not well perceived. The average overall scores of the three presences were less than 3 out of a 5-point Likert scale, which reflect that a community of inquiry of online learning had not yet established.

Students from different schools did not show significant difference in perceived social and cognitive presences, while students from the school of E&L reported that they experience a higher level of teaching presence. Students from school of S&T were found to be the most active participants, in terms of messages written and read. Though the levels of satisfaction and perceived attainment of respondents from all schools were found to be satisfactory, the low participation rate suggests that there could still be room for improvement.

For the explanatory power of the CoI model, all the three presences were found to be positively correlated to students' satisfaction and perceived attainment. Students with higher perceived teaching, social or cognitive presences reported a higher score of satisfaction as well as perceived attainment. The participation of the online conference, however, was found not associating with any of the three presences. When the effect of the three presences were considered as one single model, multiple regression showed that the cognitive presence is the dominating predictor to both satisfaction and perceived attainment. When cognitive presence was controlled statistically, the effect of social presence and teaching presence were not so significant. Analysis of survey data seems to support the postulation by Garrison and Anderson (2003) that both teaching and social presence support and enhance cognitive presence. However, owing to limitation of the multiple regression tests, a clear causal relationship of the presences might need further verification. Nevertheless, the CoI model was found to be empirically valid to illustrate the teaching and learning via online conference.

Chapter 5 Discussion, implications and conclusions

5.1 Introduction

This chapter is a discussion of the data analyses that have been presented in Chapter 4.

After the introduction, there are four sections in the present chapter. The second section is a review of the research questions 2 and 3, which reveal the explanatory power of the CoI model and effects of the various presences on learners' satisfaction and perceived attainment on the use of online conference in a context of distance learning. Implications of the result are also discussed. The third section discusses practical issues in the use of online conference as an instructional medium in the OUHK. Specific recommendations for online tutorial and instructional design for distance learning programmes with the support of online conference are also suggested. The fourth section provides suggestions for future researches, and the last section is a summary of the chapter.

5.2 Explanatory power of the CoI model

The community of inquiry model is proposed by Garrison and his research team (Rourke et al. 2001a; Anderson et al. 2001; Garrison et al. 2000, 2001; Garrison & Anderson 2003) to provide a theoretical foundation for learning via online conference. The CoI model suggests that learning through online conferencing occurs within a community through the interaction of cognitive, social and teaching presences (Garrison & Anderson 2003). Among the three presences of the CoI model, only the impact of social presence on learning has been empirically investigated. Teaching and cognitive presences are both originated from Garrison and his research team (Rourke et al 1999, Garrison et al 2000), and their impact on students' learning has never been empirically explored.

In establishing the new model, a number of content analysis studies were conducted to reveal the nature and characteristics of cognitive, social and teaching presences in the conference messages. However, owing to the limitation of the methodology adopted, empirical studies revealing the effect of the various presences and generalization of the findings were rare, if any.

The present study has tried to establish a quantitative instrument to measure learners' perception of the various presences in the CoI model and examine if there is any relationship between the perceived presences and students' satisfaction of the use of online conference, their perceived attainment and actual participation in online conferencing. As shown in the methodology chapter, the questionnaire in the present study, which was designed on the basis of the content analysis framework by Garrison and Anderson (2003), was found to be a valid instrument to measure the various presences since there was strong correlation between students' perceptions by questionnaire and content analyses of the presences. The CoI model as a whole, and any one of the three presences as an independent variable, was shown to be valid predictor of students' satisfaction and perceived attainment, but none of the three presences showed significant or considerable correlation with students' productive and receptive participation in the conference.

There have been previous studies investigating factors affecting students' satisfaction and perceived attainment in online conferencing, as presented in section 2.3. Most of the studies reviewed focus on amount of interaction between students and their teachers (Fulford & Zhang 1999, Jiang & Ting 1999, Essex & Gagiltay 2001, Swan 2001, Eom et al. 2005), but the quality and characteristics of the interaction have not been further investigated. Other studies focus on a handful of individual factors of online learning, such as self-motivation, time spent in conferencing, personality of learners, etc. (Graham & Scarbough 2001), but no effort has been made to establish a

more holistic model or theory.

There are also some researches, applying the theory of presence, focusing on a more theoretical construct, such as social presence (Gunawardena & Zittle 1997, Tu 2000, Richard & Swan 2003, Swan & Shih 2005), transactional presence (Shin 2003) and institutional presence (Shin & Chan 2004), and significant effects on the satisfaction or perceived attainment were shown. However, all the presences mentioned here reflect no more than one particular dimension of the learning process.

The CoI model, which consists of three different elements of a successful online learning community, was considered to be much more encompassing in illustrating the teaching and learning process in online conferencing. The meaning of the findings and their implications to online learning will be discussed in the following sections.

5.2.1 CoI model and students' satisfaction and perceived attainment

Students' level of satisfaction and perceived attainment in the learning process has long been major concerns in previous studies of online learning (e.g., Alavi 1994; Gunawardena & Zittle 1997; DeBourgh 1999; Arbaugh 2000b, 2001; Jiang & Ting 2000; Graham & Scarbough 2001; Gunawardena & Duphorne 2000, 2001; Lim 2001; Swan 2001; Richardson & Swan 2003; Shin & Chan 2004; Eom et al. 2005). In the present study, satisfaction and perceived attainment, together with participation, were chosen as major dependent variables to explore the effect of cognitive, social and teaching presence.

Parallel to earlier studies, the present study found that social presence was significantly correlated to satisfaction (Gunawardena & Zittle 1997, Duphorne 2000, Tu 2000, Richardson & Swan 2003, Swan & Shih 2005). The present study also demonstrated that social presence was also significantly correlated to perceived attainment, a relationship which had not been explored in previous studies. Although the

operationalization of social presence in the CoI model is not identical to those in the earlier studies mentioned, they are all originated from the same concept proposed by Short et al. (1976), and, to a certain extent, are similar to one another.

Besides social presence, the other two components of the Community of Inquiry model, i.e., cognitive and teaching presences, were also found to be significantly correlated to satisfaction and perceived attainment, and cognitive presence had substantially higher correlations with both dependent variables when compared with social presence and teaching presence. When the three presences of CoI model were entered into a stepwise multiple regression analysis, cognitive presence became the only significant factor on satisfaction. With respect to the dependent variable perceived attainment, stepwise multiple regression showed that only cognitive presence and teaching presence were significant predictors, but not social presence. When compared with cognitive presence, nevertheless, the effect of teaching presence on perceived attainment, in terms of R^2 changed, was much smaller.

The outcome of multiple regression has shown that the sole emphasis on social presence in explaining the efficacy of online conference in the previous researches (e.g., Gunawardena & Zittle 1997, Tu 2000, Richardson & Swan 2003, Swan & Shih 2005) might not be appropriate, because the dominating factor of cognitive presence was totally ignored.

Although the causal relationship between the three presences could not be firmly established simply by multiple regression analyses, the postulation that teaching and social presence both support and enhance cognitive presence (Garrison et al. 2000, Garrison & Anderson 2003) was supported by the survey data. If social presence and teaching presence are indirectly affecting students' satisfaction and actual learning via the intervening variable cognitive presence, as suggested in the present study, it would

be more appropriate for online tutors or instructors to focus on the idea of cognitive presence. In fact, qualitative responses in the present study, i.e., those in the open-ended question, also supported the conclusion that teaching and cognitive presences were more important elements among the three presences of CoI model.

What this means is that in order to fully utilize the online conference, pure social communications among participants is not adequate. The function of online conference as a platform of knowledge construction should be focused on and enhanced. Online tutors should be equipped with skills and knowledge of the practical inquiry model (Garrison et al 2001), and be encouraged to present a stronger teaching presence in their conference messages. At the same time, students need a more thorough understanding of the function of the communication tool, and of ways of constructing knowledge in a collaborative manner. Some more detailed discussion will be presented in a later section where recommendations are suggested in the context of the OUHK.

5.2.2 CoI model and students' participation in online conference

Among the three major criterion variables in the present study, students' participation was the only one that was not significantly correlated to the three presences of CoI model. Among the OUHK respondents in the present study, both productive and receptive participation were found remaining at a very low level regardless of the level of various presences.

In view of the significant correlation of the three presences on students' satisfaction and perceived attainment, as was revealed in earlier sections, it was quite unexpected to find that students' participation was independent from various presences in CoI model. Follow up correlation analyses showed that students' participation was not significantly correlated with students' satisfaction and perceived attainment.

It is worth noticing that the present study was based on one particular institution in

Hong Kong, i.e., the OUHK, so the independency of students' participation from various presences might not be able to be generalized to other settings. As introduced in chapter 2, the use of online conference in the OUHK was entirely on a voluntary basis and students' participation did not contribute to their overall grades as is the case in some other sitiations discussed in Chapter 2 (section 2.1.2.1). Moreover, students in the OUHK were also provided with frequent and regular face-to-face tutorials, and students can have ample opportunity to interact with their tutor and fellow students other than through online conferencing. All these factors may lead to such a low participation in the online conference in the OUHK, as Tolmie and Boyle (2000) suggest, that students will participate more actively in the online conference when there is no other alternative channel of communication. Another possible reason for the low participation in online conference is the learning style of Chinese students. According to Tu (2001), "Chinese students are hesitant to participate in open discussions, preferring to learn from the instructor rather than sharing possibly erroneous opinions of fellow students" (p.50). This is supported by one of the responses made for the open-ended question in the questionnaire.

> "It [online conference] is useful whenever it is useful. It really depends on the CC's management. Our discussion Board this time seems cool as it provide a platform for use to share information and tutor respond to. But if it comes to something call discussion, other students may not raise voice. This is Hong Kong, a typical Chinese culture." (response 3, with typos corrected)

Using online conference for the purposes of discussion or knowledge construction were not common for the students in the OUHK, instead, the platform was used to deliver teaching and learning materials by tutors or simply for Q&A. The statistics of the present study also support the above point of view. On average, each of the participants in the present study posted only 3.88 messages, but read 142.02 messages over a 6-month period. Most of the students, therefore, aimed at seeking information

rather than participating in or contributing to discussion.

However, it is expected that in an online conference with more active participants, the effect of various presences on their rate of participation might be much more significant. It is, therefore, worth further investigation to see if the three presences show stronger effect on students' participation where online conference is a major communication channel.

Nevertheless, the present study reveals that there could be factors other than the three presences impacting on learners' participation in online conference. In fact, as it was shown in section 2.3.1, a number of factors affecting students' participation have been identified in previous studies, i.e., students' characteristics, teachers' characteristics, feature of the online conference platform, and pedagogical arrangement. However, none of them directly relate to the actual teaching and learning endeavour reflected in the conference messages. Earlier studies, such as Tu (2000) and Swan and Shih (2005), have tried to explore the relationship between social presence and students' participation, but both studies suggested, as this one did, there was no significant relationship between them.

It is worth noticing that an earlier study in the OUHK showed that the number of tutor's postings has a strong correlation with both students' receptive participation (r=0.762, p=0.01) and productive participation (r=0.782, p=0.000) (Tsang et al. 2002). It is clear that the productive participation of tutors, in terms of number of messages posted, was a dominant factor to students' participation while the effect of the perceived presences from the messages was not so prominent. Therefore, it could be the actual involvement of tutors per se that triggers students' participation, but not the perceived presences in the messages. When tutors were not actively involved in the conference, as reflected by the low teaching presence perceived ($\bar{x} = 2.69$ in a 5-point

scale), social and cognitive presences perceived did not effectively motivate students' participation. Following this line of thinking, the present researcher suggests that there might exist a threshold level of teaching presence to activate students' overall participation in the online conference, and this could be a direction for further research.

Responses from the open-ended question in the survey also support the idea that tutors' participation was crucial to the success of online conferencing in the OUHK. Among the 56 responses for the open-ended question, 16 responses referred to tutor's participation or teaching presence (refer to Table 4.12). 5 of them criticized the low participation rate of tutors in general, and 2 of them commented on their slow responses. Pedagogical issues were not totally excluded, since there were 9 respondents who criticized that tutors "do not raise questions for discussion" (n=6) nor "offer guidance and constructive responses" (n=3). Another 5 respondents criticized that the conference was not properly used as a platform of discussion. These show that at least some students expected a higher level of teaching presence and cognitive presence, and these in turn might also motivate their participation in the online conference.

However, the idea of threshold level of teaching presence is only a preliminary speculation, and much more effort has to be involved in further empirical researches to verify the idea.

5.2.3 Further theorization of the CoI model

On the basis of the quantitative content analyses suggested by Garrison and his research team (Garrison & Anderson 2003), the present study adopted a new method, i.e., quantitative survey, for measuring cognitive, social and teaching presences in conference messages. Having compared the result of the survey with the content analysis of conference messages in the pilot study, the instrument was validated as a

tool to measure the various presences in conference messages.

Unlike the earlier content analysis studies by Garrison and his research team, the different presences measured in the present study are in the same scale and therefore comparable. The standardization in the measurement of presences enables direct comparison of the three presences and their relationship with students' satisfaction, perceived attainment and participation. Statistical tests suggest that all the three presences are significantly correlated to students' satisfaction and perceived attainment. The CoI model, therefore, can successfully explain part of the efficacy of online conference as a learning tool.

On the basis of the validated instrument in the present study, more quantitative studies can be conducted to further explore the relationship between the various presences in CoI model and other environmental or outcome variables in a context of online conferencing. Independent variables such as class size, discipline of study, computer literacy of students, characteristics of tutors, etc., are all factors worth investigation. Possible dependent variables for further studies can be students' actual achievement in a course, motivation for learning, and other indicators of students' participation, such as frequency of log-ins or time-spent in online conference. .

With the new instrument of measuring various presences in the conference, the strength of the CoI model can be further explored, so as to further enrich the CoI model.

The present study is also one of the earliest endeavour to provide some empirical hints on the relationship among the three presences of the CoI model. Statistical tests support the postulation made by Garrison and his research team (Garrison et al. 2000, Garrison & Anderson 2003), i.e., teaching presence and social presence both support and enhance cognitive presence. However, more advanced statistical studies, such as

path analysis or structural modeling, are required to verify the causal relationship between the three components of CoI model.

Although the three presences in the CoI model were found to be significantly related to the students' satisfaction and perceived attainment, the R^2 in the multiple regression models for satisfaction and perceived attainment were only about 20% and 39% respectively. The 3-component CoI model probably has not encompassed all the possible factors which determine the effect of online conferencing as a learning tool. The unexplained variance of the two criterion variables is another area of further development of the CoI model.

What is therefore being argued here is that the second and third research questions, namely:

- Can the "community of inquiry" model, in which the three types of "presences" are independent variables, help us to understad students' performance and satisfaction in online conference?
- What are the statistical correlations between students' perception of teaching presence, cognitive presence and social presence in the "Community of Inquiry" model?

have led to important insights about the CoI model. It is a powerful model for explaining online conferencing even if it needs further refinement.

The first question:

- How is the online conference used and perceived as a learning tool of distance learning courses among students in the OUHK?

has a more local focus in the operation of the OUHK, and it will be discussed after the limitations section below.

5.2.4 Limitations

As an empirical investigation of a learning theory in the field of online learning, the present study has the following limitations:

The sample of the study was drawn entirely from one single institution in Hong Kong, i.e., the OUHK. The chosen institution is the only institution in Hong Kong adopting a full-featured distance mode of learning, and it provides the most systematic online support in Hong Kong. However, the OUHK was adopting an "adjunct mode" of online learning (Harasim 1989), where online conference was used as a supplementary communication tool for students, on top of the regular face-to-face tutorials. The use of the online conference was entirely voluntary, and it probably affected the actual use and participation rate of students. The data collected in the present study may not perfectly represent general online learners. It is important to exercise caution in generalizing the findings obtained from the present study to other distance learning institutions using mixed mode or online mode of learning. Similarly, the findings could have limited generalizability to online communities within conventional universities.

Another limitation is the low return rate of the main survey. After excluding the non-active users of the online conference, the return rate was 11.16%, which is generally considered to be on the low side of the range of return rate in online survey as revealed by Schonlau et al. (2001). The low return rate might then affect the generalizability of the present study even within the OUHK, though the characteristics of the sample of elements were found to be quite similar to those of the population. Since the online conference was only supplementary to the other communication channels in the OUHK, some students in the selected courses had in fact never or seldom participated in the online conference. If non-users and non-active users were not included in the sampled population, the return rate would be much improved.

Third, the research instruments, i.e., questionnaire, and coding scheme for content analysis, are all based on existing studies developed in Western countries. For example, the indicators in the coding schemes of social and cognitive presences might reflect western style of social and intellectual communication, which may not be equally received in Hong Kong, in which Chinese culture is still dominating. Although the instruments have all been carefully examined with respect to their validity and reliability, the suitability of those instruments for Hong Kong Chinese learners may need further exploration.

Finally, for the establishment of the interrelationship among the three presences, multiple regression analysis was used, and causal relationship among them could not be formally verified. Since the present research is only an exploratory study in the field, and the sample size as well as research resources were limited, more advanced statistical analyses like path analysis and structural modeling were considered not appropriate. According to Boomsma (1983), a sample size of 200 is adequate for small to medium size models. the sample size (n=162) in the present study, therefore, does not meet the criterion. The interrelationship of teaching, social and cognitive presences suggested in the present study, therefore, might need further verification.

5.3 Use of online conference in the OUHK

The present study was conducted in the context of the OUHK. By conducting an online survey, students' participation, satisfaction and perceived attainment in the online conference were measured. Their perceived teaching, social and cognitive presences in the conference were also reported. The data collected, therefore, could serve as a systematic evaluation of the use of online conference in the OUHK. The following sections discuss the current use of online conference in the OUHK, and then recommendations are provided for improvement.

5.3.1 Present use of online conference in the OUHK

Online learning support was first provided in a distance-learning course in the OUHK in 1997, when the first pilot online course was launched. After some trial of a commercial online learning platform, Web-CT, an self-developed online platform, Online Learning Environment (OLE), was then formally integrated into the distance learning courses of the OUHK in 1998, and the number of courses involved increased subsequently in the years after. When the survey was launched for the present study in 2006, almost all distance-learning courses in the OUHK were supported by an online component. Course materials are now provided in dual modes, i.e. students are provided with a pack of print-based materials and they can also access the same set of materials through the online platform, together with multimedia and online activities. Online conferencing is an integrated component of the online learning platform, but the use of it is entirely on a voluntary basis, for both students and tutors.

In fact, students are encouraged to fully utilize the communication tool to facilitate their learning. In the orientation package for new students of the OUHK, there is a user-guide of the OLE and a CD-Rom containing video instruction on the use of OLE and other electronic learning facilities in the OUHK. Tutors in the OUHK are also encouraged to participate in the online discussion with students. The OUHK also provides a short course for novice online tutors, in which moderating skills in online conferencing are introduced.

However, considering the fact that some students in the open-entry institution might not have adequate computer literacy for online learning, the online learning support in the OUHK serves primarily as a supplementary component. Only students in the School of Business & Administration are required to submit their assignment via the OLE, but their participation in the online discussion is still on a voluntary basis. Most

of the students in the OUHK, if they wish, can earn all the required credits for a degree without ever logging-in the discussion board of OLE.

Under such circumstances, the present study reveals that the overall participation, especially in terms of number of messages posted, of the online conferencing was very low. While Garrison (1997, 2000), as well as many other scholars (e.g., Applebee 1984, Fulwiler 1987, White 1993), argues that the text-based online communication encourages deep or critical thinking and retrospective analysis, the overall score of the perceived cognitive presence, i.e., the dominant factor of students' satisfaction and perceived attainment, was lower than 3 in a 5-point scale. The scores of perceived teaching presence and social presence were even lower (refer to Table 4.6). Most of the respondents in the open-ended question reported that tutors and their fellow students were far from enthusiastic in participation of the online conference, and the online conference was used mainly as a platform of delivering tutorial notes or Q&A.

There were also misconceptions in the use of online conference among students and tutors. Some respondents believed that the conference should be used only for subject-related discussion, and they complained that their fellow students often posted "non-relevant" messages in the conference. However, "use of humour", "self-disclosure" and "phatics, salutation" are all indictors of social presence. Avoiding all these social interaction, and making the conference a pure "academic" forum will certainly reduce the sense of social presence. Social presence, as argued by Garrison et al. (2000) and Garrison and Anderson (2003), can facilitate cognitive presence in the conferencing, and this is supported by the present study. Another misconception of using online conference was that most students made it a "question-and-answer" platform and looked for quick answers from their tutors. This is also reflected in the distribution of the messages in the four phases of practical inquiry model (Garrison et al. 2001). Perception of the cognitive presence revealed that most of the messages

perceived were "triggering events", and the occurrence of higher phases gradually declined, and this is parallel to an earlier study analyzing the pattern of critical thinking in online courses in the OUHK (Choi et al. 2004). That means in-depth discussion, follow-up questioning, and debate were not common in the conference messages.

A respondent of the open-ended question reported that about 90% of the messages in his/her course focused mainly on assignments, but discussion on other topics was rare (response 37). The Q&A interaction concerned mainly requirements of assignment or clarification of concepts in the questions, and these certainly did not favour in-depth discussion among students or high-order critical thinking. Thus it is clear that most of the students in the OUHK have little, if any, ideas of critical thinking or practical inquiry model of learning suggested by Garrison et al. (2001). In order to utilize the online conference, students should have basic understanding of the practical inquiry model, and accept the idea of collaborative construction of knowledge. Otherwise, a sense of community of inquiry could not be established among learners in the OUHK.

The attitude and participation of course-coordinators and tutors may be an even more important factor to the success of the online conference. Some of the tutors, according to the responses of the open-ended question, were not actively participating in the online conference and some students complained that their tutors and course coordinators did not respond to students' questions frequently or promptly. Some of them were simply absent from the discussion. One respondent reported that his/her tutor said that "discussion board is for students to find the answer within themselves" (response 6). Some students suggested that tutors should post discussion question in the conference so as to arouse students' interest in discussion. Their request reflected the fact that some of their tutors had never or seldom done that, not to say the various components of teaching presence, like instructional design, organization, facilitating discourse, or direct instruction in the conference messages.

In a training course for new online tutors in the OUHK, the present researcher, serving as a course moderator, was told by the participants that it took them quite some time every day to respond to students' inquiry through the discussion board. Their participation in the conference, however, was not formally recognized as part of their workload, on top of face-to-face or telephone tutorial. Another excuse for not participating actively in the conference was that tutors believed that students could have adequate communication with their tutors via regular face-to-face tutorials.

Another factor for consideration is that teaching and learning style among the Chinese learners in the OUHK focuses on one-way knowledge transmission, as it is argued by Lai and Tang (1999), Fung and Carr (1999) and Fung (2000), and it does not favour social constructivist learning advocated by the Community of Inquiry model. The features of online conference were therefore far from fully utilized in most of the courses in the OUHK. There is still a long way to establish a sense of community of inquiry among the online learners in the OUHK.

Despite all the obstacles mentioned above, it was also revealed in some of the responses that students in certain courses did make a good use of the tool to promote learning and communication. The online conference was also regarded as a tool for reducing loneliness in the learning process. These witnesses showed clearly that when it was properly used, online conference could still be used effectively and constructively in the OUHK. Even the complaints made by students also suggested that students do have some expectations about the use of the online communication tool.

It is suggested by Gunawardena and Zittle (1997) that the sense of social presence is not entirely depending on the medium used, but can be taught or cultivated. Similarly, the various presences in the CoI model can also be promoted in an environment of online conference. In order to promote the sense of online community of inquiry, a

number of recommendations are made below.

5.3.2 Practical recommendations

In order to effectively utilize the online conference in the distance learning courses in the OUHK, a number of measures are suggested in the light of the Community of Inquiry model suggested by Garrison et al (2000) and the findings of the present study.

The recommendations can be classified into four categories, related to policy innovation, tutor training, orientation to new students, and instructional design of distance learning materials. All the suggestions aim at building up an efficient online community of inquiry.

Policy innovation

If critical thinking is considered to be valuable and online conferencing a good way of achieving this, innovation in the pedagogical arrangement and assessment are worth thinking about. Experience in other distance learning institutions shows that the best way of promoting online conferencing is to make it a requirement to students (Tolmie & Boyle 2000). In many online learning programmes provided in the States, Australia or UK, students' performance and participation in the online discussion are mark-bearing. Course coordinator or tutor can raise a subject-related issue or question in the online conference and students are required to participate in the discussion. Among the 4-5 assignments in a yearlong course in the OUHK, one assignment can be replaced by well-planned online discussion and the workload of both students and tutors will not be much increased.

Tutors' responses to students' questions and moderation of online discussion could be made a required task for tutors, and tutors' frequent and prompt responses can then be guaranteed. Another way of providing better online support for students is to hire an

"online-tutor" who is specialized in moderating the online conference. Thus, it is certain that there is at least one active and experienced online tutor in each course.

Tutor training

Even though there is active participation from the online tutors, the online conference may not be successful if the tutors do not hold a constructivist view of learning and possess moderating skill. The current short online tutor training course in the OUHK focuses mainly on e-moderating skills such as facilitating, weaving, and drawing conclusion, but the benefit and rationale of this kind of collaborative learning and the theory of social constructivist learning are not emphasized. Based on the CoI model, online tutor training course can include the idea of practical inquiry model (cognitive presence), and techniques of promoting cognitive presence, i.e., promoting teaching and social presences. The various indicators of various presences for content analysis are in fact a very good basis for moderating skills. More concrete techniques of online conferencing can be developed on the basis of these indicators.

Orientation to new students

To utilize the features of online conferencing, students of the OUHK should be equipped with basic information communication skills. They should also master the idea of the practical inquiry model, and the role of an active participant in an online conference. It is suggested that all of the new students in the OUHK are required to take a credit bearing online course of ICT skills. Online collaboration and critical discussion are core components of the course requirement. Students taking this course could have a taste of successful and meaningful online discussion at the beginning of their learning. This would in turn facilitate their later use of online conference.

Instructional design of distance learning materials

The first distance learning course with online components was formally launched in 1998. Before that, print-based self-learning study units were used as the major teaching materials. The instructional design of the study units did not aim at enhancing real interaction between students and their tutors or among students themselves. Even after incorporating the online conference as channel of communication, the approach of instructional design of the study units did not make much difference. One of the considerations was that a major portion of the students were not familiar with the OLE and the approach of learning. The arrangement, however, in turn prohibits the full utilization of the communication tool.

In order to facilitate more effective learning through online discussion, the approach of instructional design of the distance learning material should also be changed. For example, study units can be incorporated with collaborative learning activities, and students are required to take an active part in the activities so as to get additional information for their learning. When online discussion becomes a core part of the learning process, students will certainly be motivated to take a more active part in the online conference.

5.4 Recommendations for future research

The present study is a preliminary study of the explanatory power of the CoI model and the interrelationship of the various presences in the CoI model. Owing to limitation of resources and time, further investigations are beyond the scope of this study. Following up the previous sections, a number of recommendations for further researches are proposed.

Further development of the instrument of measuring various presences

The questionnaire of the present study is basically translated form the coding schemes for content analysis suggested by Garrison and Anderson (2003). The reliability and criterion validity of the instrument have been tested, and the perceived presences measured by the instrument are valid predictors of the various presences in the conference messages. Since the reliability and validity of the various indicators in the coding schemes for content analysis have been examined (Rourke et al. 2001a, Garrison & Anderson 2003, Rourke & Anderson 2004, Garrison et al. 2006), factor analysis of the items for the three presences have not been done. To further establish the construct validity of the questionnaire, a survey with a larger sample (n>300, as suggested by Tabachnick & Fidell 2007) is recommended and a factor analysis can be adopted to further verify or reduce the items for the various presences.

Generalization of the research findings

The subjects of the present study were confined to the students in the OUHK, in which online learning platform and conferencing tool are provided as supplementary components. The findings on the relationship between various presences in the CoI model and students' satisfaction, perceived attainment, and participation might not be susceptible of generalization to other institutions, especially those applying online conference as major or required communication tool.

Moreover, the present study revealed that various presences of the CoI model were not associated with students' productive or receptive participation in online conference. However, the result might be different when discussion via online conference becomes a major channel of communication between learners and their tutors, or when the tutors and students participate more actively in the conference. Therefore, replications of the present study in different settings, including other distance-learning institutions and

conventional campuses, are proposed to re-examine and consolidate the findings in the present study. The replication can also explore the adaptability of the CoI model.

Further development of the CoI model

Owing to limitation of resources and sample size, only multiple regression was adopted in analyzing the effect of various presences as a whole. A major weakness of multiple regression, however, is that it is incapable of establishing causal relationship among variables. The casual relationship between various presences and the criterion variables, as well as the interrelationship among the three presences, therefore, could not be confirmed. In order to establish the causal relationship mentioned above, more advanced statistical techniques such as path analysis or structural modeling can be used. Replicated studies with a larger sample are therefore recommended.

Another possible modification of the CoI model is to include other contributing factors to the model. When all the three presences of the COI model are entered into multiple regression analyses, only 20.1% of the variance of satisfaction and 39.5% of the variance of perceived attainment were explained. The 3-element CoI model is far from perfect in explaining the learning experience in online conference. One of the challenges to further establish the model is to explore the possibility of other factors contributing to learners' experience.

5.5 Summary and conclusion

The present study is an endeavour to explore and validate a recently developed Community of Inquiry model (Garrison et al. 2000; Garrison & Anderson 2003), which is devoted to explaining the condition of teaching and learning in a context of online conference. On the basis of the content-analysis studies by Garrison and his partners (Rourke et al. 2001a; Anderson et al. 2001; Garrison et al. 2000, 2001), the present researcher developed a questionnaire to measure the 3 basic elements of the model, i.e.,

cognitive, teaching and social presences. An online survey was conducted in the OUHK, a distance learning institution in Hong Kong, to see if the model could help us to understand students' participation, satisfaction and perceived attainment in the online conference. The reliability and validity of the scales for various presences were verified in a pilot study, in which students from 4 courses were invited to participate in an online survey, and their conference messages were analyzed.

A descriptive analysis of the responses in the main survey (n=162) was conducted to reveal how online conference was used and perceived in the OUHK. Responses of an open-ended question were also analyzed. It was found that:

- while online learning conference had been offered in the OUHK for 8 years, the participation rate of students was low in general, and the tool had not been fully utilized;
- some tutors did not actively participate in the online conference, and the perceived teaching presence in the online conference was low;
- all the 3 presences students perceived were at a low level, i.e., mean score less than 3 in a 5-point scale.

As an effective tool for collaborative critical thinking, the use of online conference in the OUHK was far from satisfactory. One of the possible reasons was because of its supplementary role in the teaching and learning process. Most of the students and tutors had little knowledge in utilizing the online conference as a learning tool enhancing critical thinking skills, and a sense of community of inquiry had not yet been developed among learners in the OUHK. In order to promote and utilize the communication tool for more effective learning, the following recommendations were made:

- to make participation in online conference a required task to complete a course, and where appropriate, marks are allocated according to students' performance in the online conference;

- both tutors and students should be provided with training on the use of online conference, to make sure that they can appreciate the strength of this communication tool;

- online discussion and collaborative learning activities can be incorporated in the assignment or distance learning materials.

For the explanatory power of the CoI model and the interrelationship among the various presences, a quantitative survey analysis was conducted. Correlation and ANOVA analyses in the study showed that:

- all the 3 presences in the CoI model were correlated with students' satisfaction and their perceived attainment through online conferencing;

- students with higher perceived social, cognitive or teaching presence also reported higher satisfaction and perceived attainment in the online conferencing;

- none of the 3 presences had significant and substantial impact on learners' productive or receptive participation in the communication tool.

A series of multiple regression analyses also showed that:

- among the 3 presences, the most significant predictor to students' satisfaction and perceived attainment was cognitive presence;

- when the effect of cognitive presence was controlled, teaching and social presences had little effect on the two criterion variables;

- it was suggested that social presence and teaching presence exert their impact on

the criterion variables, mediated by cognitive presence.

As it was reviewed in the previous sections, most of the previous studies on online conferencing (e.g. Gunawardena & Zittle 1997; Tu 2000, 2001, Swan & Shih 2005) have put their sole emphasis on social presence, the findings of the present study has shed light in the recently explored area. In the eyes of online learners, it is the cognitive presence, not social presence, that really matters.

However, owing to limited resources, time constraints and others factors, the present study has the following limitations:

- the subjects were from one single institution in Hong Kong, and the generalizability of the findings is limited;
- the return rate and sample size were comparatively small, and statistical analyses for causal relationship like path analysis and structural modeling, as well as other advanced statistical tool, such as factor analysis, have not been conducted;
- the instruments are all originated from a western culture, and the suitability of them in a Chinese community has not been confirmed.

In order to further develop the CoI model, the following recommendations for further studies are made:

- to replicate the present study with a larger sample size so as to fine-tune the instrument (by factor analysis) and verify the causal relationship proposed in the present study (by structural modeling) ;
- to replicate the present study with online learners from various settings so as to generalize the findings of the present study;
- include other possible factors in the analysis so as to expand the explanatory

power of the CoI model in online conferencing.

References

Alavi, M. (1994) "Computer-mediated collaborative learning: An empirical evaluation", *MIS Quarterly*, 18(2), p.159-174.

Allen, I.E., & Seaman, J. (2004) *Entering the Mainstream: The quality and extent of online education in the United State, 2003 and 2004*. Needham, MA: The Sloan Consortium.

Allen, I.E., & Seaman, J. (2005) *Growing by Degrees: Online education in the United States, 2005*. Needham, MA: The Sloan Consortium.

Ally, M. (2004) "Foundation of educational theory for online learning", in T. Anderson & F. Elloumi (Eds) *Theory and Practice of Online Learning*. Athabasca: Athabasca University, p. 3-31.

Anderson, T & Elloumi, F. (Eds) (2004) *Theory and Practice of Online Learning*. Athabasca: Athabasca University.

Anderson, T. (2004) "Toward a theory of online learning", in T. Anderson & F. Elloumi (Eds) *Theory and Practice of Online Learning*. Athabasca: Athabasca University, p. 33-60.

Anderson, T., Rourke, L., Garrison, D. R., & Archer, W. (2001) "Assessing teaching presence in a computer conferencing environment", *Journal of Asynchronous Learning Networks*, 5 (2). Retrieved on 11 November, 2002, from http://www.aln.org/alnweb/journal/jaln-vol5issue2v2.htm

Applebee, A.N. (1984) "Writing and reasoning", *Review of Educational Research*, Vol. 54, p.577-596.

Arbaugh, J.B. (2000a) "How classroom environment and students engagement affect learning in Internet-based MBA courses", *Business Communication Quarterly*, 63(4), p.9-18.

Arbaugh, J.B. (2000b) "Virtual classroom characteristics and student satisfaction in Internet-based MBA courses", *Journal of Management Education*, 24(1), p.32-54.

Arbaugh, J.B. (2001) "How instructor immediacy behaviour affect students satisfaction and learning in Web-based MBA courses", *Business Communication Quarterly*, 64(4), p.42-54.

Babbie, E. (1995) *The Practice of Social Research* (7th Ed.). Belmont, CA: Wadsworth.

Baker, E. L. (2000) *Understanding educational quality: Where validity meets technology*. Princeton, NJ: Educational Testing Service.

Barker, B., Frisbie, A. & Patrick, K. (1989) "Broadening the definition of distance education in the light of the new telecommunications technologies", *The American Journal of Distance Education*, 3(1), p. 20-29.

Berelson, B. (1952) *Content Analysis in Communication Research*. Illinois: Free Press.

Berge, Z. L. (1995) "Facilitating computer conferencing: Recommendations from the field", *Educational Technology*, 15(1), p. 22-30. Retrieved on 12 June 2002, from http://www.emoderators.com/moderators/teach_online.html

Berge, Z.L. (1999) "Interaction in post-secondary web-based learning", *Educational Technology*, 39(1). p.5-11.

Berge, Z.L. & Collins, M. P. (eds.) (1995) *Computer Mediated Communication and the Online Classroom. Volume 1: Overview and perspectives.* Cresskill. N.J.: Hampton Press.

Bernard, R., Abrami, P., Lou, Y., & Borokhovski, E. (2004) "How does distance education compare with classroom instruction? A meta-analysis of the empirical literature", *Review of Educational Research*, 74(3), p.379-439.

Biocca, F. (1997) "The cyborg's dilemma: Progressive embodiment in virtual environments", *Journal of Computer Mediated Communication*, 3(2). Retrieved on 11 November, 2003, from http://jcmc.indiana.edu/vol3/issue2/biocca2.html

Bischoff, W.R., Bisconer, S.W., Kooker, B.M., & Woods, L.C. (1996) "Transactional distance and interactive television in the distance education of health professionals", *The American Journal of Distance Education*, 10(3), p. 4-19.

Bloom, B.S. (1981) *All Our Children Learning: A primer for parents, teachers, and other educators*. New York: McGraw-Hill.

Boomsma, A. (1983) *On the Robustness of LISREL (maxium likelihood estimation) against small sample size and non-normality*. Unpublished Ph.D dissertation, University of Groningen, The Netherlands.

Boyd, R. & Apps, J.W. (1980) *Redefining the Discipline of Adult Education*. San Francisco: Jossey-Bass.

Briggs, S.R. & Cheek, J.M. (1986) "The role of factor analysis in the development and evaluation of personality scales", *Journal of Personality*, Vol. 54, p. 106-148.

Bryman, A. & Cramer, D. (1997) *Quantitative Data Analysis with SPSS for Windows*. London: Routledge.

Budd, R.W., Thorp, R., & Donohew, L. (1967) *Content Analysis of Communications*. New York: Macmillan.

Bullen, M. (1998) "Participation and critical thinking in online university distance education", *Journal of Distance Education*, 13(2), p.1-32.

Capozzoli, M., McSweeney, L. & Sinha, D. (1999) "Beyond kappa: A review of inter-rater agreement measures", *The Canadian Journal of Statistics*, 27(1), p. 3-23.

Caverly, D. C. & MacDonald, L. (1999) "Techtalk: Designing online developmental education courses", *Journal of Developmental Education*, 23(1), p. 36-37.

Centre for Research in Distance and Adult Learning (CRIDAL)(2005) *Guidelines for Researchers of Online Learning Environments*, Retrieved on 2 January, 2006, from http://www.ouhk.edu.hk/WCM/?FUELAP_TEMPLATENAME=tcSubWeb&lid=SUBWEBLIST_CRIDL_56689036&cid=6&lang=eng&mid=0

Chen, Y.J. & Willits, F.K. (1998) "A path analysis of the concepts in Moore's theory of transactional distance in a videoconferencing learning environment", *Journal of Distance Education*, 13(2). Retrieved on 4 June, 2002, from http://cade.athabascau.ca/vol13.2/chen.html

Chen, Y.J. (1997) *The Implications of Moore's Theory of Transactional Distance in a Videoconferencing Learning Environment.* Unpublished Ph.D Dissertation, the Pennsylvania University.

Chen, Y.J. (2001a) "Dimensions of transactional distance in the world wide web learning environment: a factor analysis", *British Journal of Educational Technology*, 32(4), 459-470.

Chen, Y.J. (2001b) "Transactional distance in World Wide Web learning environments", *Innovations in Education and Teaching International*, 38(4), 327-338.

Choi, M.F. & Tsang, Y.M. (2001) "The instructional design for Chinese online learning courses: practice and evaluation", in National Open University (Ed.) *Conference Proceedings: The New Way of Teaching and Learning*. Taiwan: National Open University. (in Chinese)

Choi, M.F., Tsang, Y.M. & Tang, K.W. (2004) "Critical Thinking in Asynchronous Text-based Conferencing: A content analysis study of discussion messages in an OUHK Web-based course", paper presented in *21st ICDE World Conference on Open Learning & Distance Education,* 18-21 Feb 2004, Hong Kong.

Clark, R.E. (1983) "Reconsidering research on learning from media", *Review of Education Research*, 53(4), p. 445-459.

Clarke, D. (1999). "Getting results with distance education", *The American Journal of Distance Education*, 12(1), p. 38-51.

Cohen, L. & Manion, L. (1994) *Research Method in Education.* London: Routledge.

Cook, T. & Campbell, D. (1979) *Quasi-experimentation: Design and analysis issues for field settings*. Chicago, IL: Rand-McNally.

Corich, S., Kinshuk, & Hunt, L.M. (2004) "Assessing Discussion Forum Participation: In Search of Quality", *International Journal of Instructional Technology and Distance Learning*, 1(12), p.3-13. Retrieved on 30 June 2006, from http://www.itdl.org/Journal/Dec_04/article01.htm

Creswell, J.W. (2005) *Educational Research: Planning, conducting, and evaluating quantitative and qualitative research*. Upper Saddle River, N.J.: Pearson Prentice Hall.

De Vaus, D. (1996) *Surveys in Social Research (4th edition)*. London: UCL Press.

De Vaus, D. (2002) *Analyzing Social Research Data: 50 key problems in data analysis*. London: SAGE.

DeBourgh, G. (1999) "Technology is the tool, teaching is the task: Students satisfaction in distance learning", paper presented at the *Society for Information Technology & Teacher Education International Conference*, San Antonio, TX.

Dennen, V.P. (2005) "From message posting to learning dialogues: factors affecting learner participation in asynchronous discussion", *Distance Education*, 26(1), p. 127-148.

Desselle, S.P. (2005) "Construction, implementation, and analysis of summated rating attitudes scales", *American Journal of Pharmaceutical Education*, 69(5). Retrieved on 20 May 2006, from http://ajpe.org/aj6905/aj690597/aj690597.pdf

DeVellis, R.F. (2003) *Scale Development: Theory and applications*. Thousand Oaks, CA: Sage.

Dewey, J. (1933) *How We Think: A restatement of the relation of reflective thinking to the educative process*. Boston: D. C. Heath.

Dillon, C. & Gunawardena, C.N. (1995) "A framework for the evaluation of telecommunications-based distance education", in D. Stewart (ed.) *Selected Papers from the 17th Congress of the International Council for distance Education*, Vol.2, Milton Keynes: Open University, p.348-351.

Dron, J. (2002) Achieving self-organization in network-based learning environments, Ph.D dissertation, University of Brighton. Retrieved on 4 June, 2005, from http://www.it.bton.ac.uk/staff/jd29/thesiscorrectedfinaldraft.pdf

Dron, J. Seidel, C. & Litten, G. (2004) "Transactional distance in a blended learning environment", *ALT Journal*, 12(2), p. 163-174.

Duncan, O. (1966) "Path Analysis: Sociological examples", *American Journal of Sociology*, 72, p. 1-16.

Dunne, F. & Honts, F. (1998) "That group really makes me think! Critical friends groups and the development of reflective practitioners", *ERIC Document Reproduction Service* No. ED423 228.

Eom, S., Ketcherside, M., Lee, H., Rodgers, M. & Starrett, D. (2005) "The determinants of web-based instructional systems' outcome and satisfaction: An empirical investigation", in P. Darbyshire (Ed.) *Instructional Technologies: Cognitive aspects of online programs*. Hershey, PA: IRM Press.

Essex, C. & Caglitay, K. (2001) "Evaluating an online course", *The Quarterly Review of Distance Education*, 2(3), p.233-239.

ETPU (Educational Technologies and Publishing Unit, OUHK) (2003) *OLE Survey for Students*, Unpublished internal report. Hong Kong: ETPU, OUHK.

Evans, T. & Nation, D. (1989) "Dialogue in practice, research and theory in distance education", *Open Learning*, 4(2), p.37-42.

Feldstein, M. (2002) "Review of E-moderating by Gilly Salmon and In good company: the secrets to successful learning communities by Don Cohen and Laurence Prusak", *eLearn Magazine*, Vol. 2002, issue 3. Retrieved on 28 September 2006, from http://delivery.acm.org/10.1145/570000/566839/p3-feldstein.html

Fintaine, G. (2002) "Presence in 'Teleland'", in K.E. Rudestam & J. Schoenholtz-Read (Eds.) *Handbook of Online Learning: Innovations in Higher Education and Corporate Training*. Thousand Oaks, CA.: Sage.

Fishman, B.J. (1999) "Characteristics of students related to CMC activity", *Journal of Research on Computing in Education*, 32(1), p.73-97.

Fraenkel, J.R. & Wallen, N.E. (2003) *How to Design and Evaluate Research in Education* (5th edn.). New York: McGraw Hill.

Fulford, C. & Zhang, S. (1993) "Perception of interaction: The critical predictor in distance education", *American Journal of Distance education*, 7, p.8-21.

Fulwiler, T. (1987) *Teaching with Writing*. Portsmouth, NH: Heinemann.

Fung, Y.Y.H. (2000) "Student participation in online discussion: patterns, intentions and barriers", paper presented at the *14th AAOU Annual Conference, Manila, Philippines*.

Fung, Y.Y.H. (2004) "Collaborative online learning: interaction patterns and limiting factors", *Open Learning*, 19(2), p.135-149.

Fung, Y.Y.H. & Carr, R. (1999) "Tutorials in a Distance Education System: students' expectations and preferred approaches", in R. Carr, O. Jegede, T. M. Wong & K. S. Yuen (Eds.) *The Asian Distance Learner*. Hong Kong: Open University of Hong Kong.

Garrison, D.R. (1989) *Understanding Distance Education: A framework for the future*. New York: Routledge.

Garrison, D.R. (1990) "An analysis and evaluation of audio teleconferencing to facilitat education at a distance", *The American Journal of Distance Education*, 4(3), p.13-24.

Garrison, D.R. (1993) "An analysis and evaluation of audio teleconferencing to facilitate education at a distance", *The American Journal of Distance education*, 4(1), p.13-24.

Garrison, D.R. (1997) "Computer conferencing: The post-industrial age of distance education", *Open Learning*, 12(2), p. 3-11.

Garrison, D.R. (2000) "Theoretical challenges for distance education in the 21st century: A shift from structural to transactional issues", *International Review of Research in Open and Distance Learning*, 1(1). Retrieved on 4 June, 2003, from http://www.irrodl.org/content/v1.1/randy.html

Garrison, D. R. (2003) "Cognitive presence for effective asynchronous online learning: The role of reflective inquiry, self-direction and metacognition", in J. Bourne & J. C. Moore (Eds.) *Elements of quality online education: Practice and direction.* Volume 4 in the Sloan C Series, Needham, MA: The Sloan Consortium.

Garrison, D.R. & Anderson, T. (2003) *E-Learning in the 21st Century: A framework for research and practice.* New York: Routledge.

Garrison, D.R., Anderson, T. & Archer, W. (2000) "Critical inquiry in a text-based environment: computer conferencing in higher education", *The Internet and Higher Education*, 2(2-3), 87-105.

Garrison, D.R., Anderson, T., & Archer, W. (2001) "Critical thinking, cognitive presence, and computer conferencing in distance education", *American Journal of Distance Education*, 15(1), p.7-23.

Garrison, D.R. & Archer, W. (2000) *A Transactional Perspective on Teaching and Learning: A framework for adult and higher education.* Oxford, UK: Pergamon.

Garrison, D.R., Cleveland-Innes, M. & Fung, T. (2004) "Student role adjustment in online communities of inquiry: Model and instrument validation", *Journal of Asynchronous Learning Network*, 8(2), p.61-74. Retrieved on 10 August 2004, from http://www.sloan-c.org/publications/jaln/v8n2/pdf/v8n2_garrison.pdf

Garrison, D. R., Cleveland-Innes, M., Koole, M., & Kappelman, J. (2006) "Revisiting methodological issues in the analysis of transcripts: Negotiated coding and reliability", *The Internet and Higher Education*, 9(1), 1-8.

Garrison, D.R. & Shale, D. (1990) "A new framework and perspective". In D.R. Garrison & D. Shale (Eds.) *Education At a Distance: From issues to practice.* Malabar, FL: Robert E. Krieger, p.123-133.

Gerlic, I. & Jausovec, N. (1999) "Multimedia: Differences in Cognitive Processes Observed with EEG", *Educational Technology Research and Development*, 47(3), p. 5-14

Gibson, C.C. (2003) "Learners and learning: The need for theory", in M. G. Moore and W.G. Anderson (eds.) *Handbook of Distance Education.* Mahwah, New Jersey: Lawrence Erlbaum, p. 147-160.

Gilbert, L. & Moore, D.R. (1998) "Building interactivity into web courses: Tools for social and instructional interaction", *Educational Technology*, 38(3), p.29-35.

Graham, M. & Scarbough, H. (2001) "Enhancing the learning environment for distance education students", *Distance Education*, 22(2), p. 232-244.

Gunawardena, C.N. (1995) "Social presence theory and implications for interaction and collaborative learning in computer conferences", *International Journal of Educational Telecommunication*, 1(2/3), p. 147-166.

Gunawardena, C.N. & Duphorne, P.L. (2000) "Predictors of learner satisfaction in an academic computer conference", *Distance Education*, 21(1), p. 101-117.

Gunawardena, C.N. & Duphorne, P.L. (2001) "Which learner readiness factors, online features, and CMC related learning approaches are associated with learner satisfaction in computer conferences?", paper presented at the *Annual Meeting of the American Educational Research Association,* April 10-14, 2001, Seattle, Washington.

Gunawardena, C.N. & McIsaac, M.S (2004) "Distance education", in D. Jonassen (Ed.) *Handbook of Research on Educational Communications and Technology (second edition)*. New York: Simon & Schuster, Macmillan, p.355-395.

Gunawardena, C.N. & Zittle, F.J. (1997) "Social presence as a predictor of satisfaction within a computer-mediated conferencing environment", *The American Journal of Distance Education*, 11(3), p.8-26.

Hao, H. & Fung, C.L. (2006) "Perceptions of students on online distance learning in Hong Kong", *International Journal of Instructional Technology and Distance Learning*, 3(8), p. 3-13. Retrieved on 25 September 2006, from http://www.itdl.org/Journal/Aug_06/article01.htm

Hara, N. & Kling, R. (2000) "*Students' distress with a web-based distance education course*", *Information, Communication & Society*, 3(4), p.557-579. Retrieved on 12 Jan 2004, from: http://www.slis.indiana.edu/CSI/WP/wp00-01B.html

Harasim, L.M. (1998) "The Internet and intranets for education and training: A framework for action", in C. de Moura Castro (Ed.) *Education in the Information Age.* Washington, D.C.: Inter-American Development Bank, p.181-201.

Henri, F. (1992) "Computer conferencing and content analysis", in A. R. Kaye (Ed.), *Collaborative learning through computer conferencing: The Najaden Papers.* Berlin: Springer-Verlag.

Hillman, D. C., Willis, D. J., & Gunawardena, C. N. (1994) "Learner-interface interaction in distance education: An extension of contemporary models and strategies for practitioners", *The American Journal of Distance Education*, 8(2), p. 30-42.

Holsti, O.R. (1969) *Content Analysis for the Social Sciences and Humanities*. Reading, MA: Addison-Wesley.

Jaccard, J. & Wan, C. (1996) *LISREL Approaches to Interaction Effects in Multiple Regression*. Thousand Oaks, CA: Sage Publications.

Jiang, M. & Ting, E. (1999) "*A study of students' perceived learning in a web-based online environment*", in *WebNet 99 World Conference on the WWW and Internet Proceedings*, Honolulu, Hl.

Jurczyk, J., Kushner Benson, S.N. & Savery, J.R. (2004) "Measuring Student Perceptions in Web-Based Courses: A Standards-Based Approach", *Online Journal of Distance Learning Administration*, 7(4). Retrieved on 26 Jan, 2005, from http://www.westga.edu/~distance/ojdla/winter74/jurczyk74.htm

Kanuka, H. & Garrison, D.R. (2004) "Cognitive Presence in Online Learning", *Journal of Computing in Higher Education*, 15(2), 30-48.

Keegan, D. (1980) *The Foundations of Distance Education*. London: Croom Helm.

Keegan, D. (Ed.)(1993) *Theoretical Principles of Distance Education*. New York: Routledge.

Kember, D., Armour, R., Jenkins, W., Lee, K., Leung, D., Li, N., Murphy, D., Ng, K.C., Siaw, I. & Yum, J. (2001) *Evaluation of the Part-Time Students Experience*. Hong Kong: ETPU, Open University of Hong Kong.

Kerlinger F.N. & Lee H.B. (2000) *Foundations of Behavioral Research* (4th ed.). Orlando, Fla: Harcourt College Publishers.

Kerr, A., Hall, H. & Kozub, S. (2002) *Doing Statistics with SPSS*. London: SAGE.

Krippendorf, K. (1980) *Content Analysis: An introduction to its methodology*, Newbury Park, CA: Sage.

Kruh, J. J. & Murphy, K. L. (1990) "Interaction in teleconferencing: The key to quality instruction", paper presented at the *Annual Rural and Small Schools Conference*, Kansas State University, Manhattan.

Labovitz, S. (1970) "The assignment of numbers to rank order categories", *American Sociological Review*, Vol. 35, p.515-524.

Lai, P. & Tang, C. (1999) "Constraints affecting the implementation of a problem-based learning (PBL) Strategy in University Courses", in J. Marsh (Ed.) *Implementing Problem Based Learning Project: Proceedings of the First Asia Pacific Conference on Problem Based Learning*. Hong Kong: The University Grants Committee of Hong Kong, Teaching Development Project.

Leidner, D.E. & Jarvenpaa, S.L. (1993) "The information age confronts education: case studies on electronic classroom", *Information Systems research*, Vol.4, p.24-54.

Liaw, S.S. & Huang, H.M. (2000) "Enhancing interactivity in Web-based instruction: A review of the literature", *Educational Technology*, 40(3), p.41-45.

Licht, M. (1995) "Multiple regression and correlation", in L. G. Grimm & P.R. Yarnold (Eds.) *Reading and Understanding Multivariate Statistics*. Washington, D.C.: American Psychological Association.

Lim, C.K. (2001) "Computer self-efficacy, academic self-concept, and other predictors of satisfaction and future participation of adult distance learners", *The American Journal of Distance Education*, 15(2), p.41-51.

Lipman, M. (1991) *Thinking in Education*, Cambridge: Cambridge University Press.

Lockwood, F. (1992) *Activities in Self-instructional Texts*. London: Kogan Page.

Lockwood, F. (1998) *The Design and Production of Self-instructional Materials*. London: Kogan Page.

Lombard, M. & Ditton, T. (1997) "At the heart of it all", *Journal of Computer Mediated Communication*, 3(2). Retrieved on 20 Jan 2002, from http://jcmc.indiana.edu/vol3/issue2/lombard.html

Mason, J. & Hart, G. (1997) "Effective Use of Asynchronous Virtual Learning Community". Retrieved on 3 Mar 2005, from http://www.arch.usyd.edu.au/kcdc/conferences/VC97/papers/mason.html

Mason, R. (1991a) "Moderating computer conferencing interaction", *Computers in Adult Education and Training*, 2(3), p. 161-173.

Mason, R. (1991b) "Moderating educational computer conferencing", *DEOSNEWS*, 1(19). Retrieved on 18 February 2003, from http://www.emoderators.com/papers/mason.html

Matheos, K. & Archer, W. (2004) "From distance education to distributed surviving and thriving", *Online Journal of Distance Learning Administration*, 7(4). Retrieved on 2 May, 2005, from http://www.westga.edu/~distance/ojdla/winter74/matheos74.htm

McAteer, E., Tolmie, A. Duffy, C. & Corbett, J. (1997) "Computer-mediated communication as a learning resource", *Journal of Computer Assisted Learning*, vol.13, p.219-227.

McIsaac, M.S & Gunawardena, C.N. (1996) "Distance education", in D. Jonassen (Ed.) *Handbook of Research in Educational Communications and Technology*. New York: Simon & Schuster, Macmillan, p.403-437.

McKlin, T., Harmon, S.W., Evans, W. & Jone, MG. (2001) "Cognitive Presence in Web-Based Learning: A Content Analysis of Students' Online Discussions", *American Journal of Distance Education*, 15(1), p. 7-23.

Messick, S. (1989) "Validity", in R.L. Linn (ed.) *Educational Measurement* (3rd Ed.), New York: Macmillan.

Meyer, K A (2003) "Face-to-face versus threaded discussions: The role of time and higher -order thinking", *JALN*, 7(3), p.55-65.

Mishra, A.K. (2002) "Economic development and skills development", in A.K. Mishra & J. Bartram (eds.) *Skills Development through Distance Education*. Vancouver: Commonwealth of Learning.

Moore, M.G. & Kearsley, G. (1996) *Distance Education: A system view*, Belmont, California: Wadsworth.

Moore, M.G. & Kearsley, G. (2005) *Distance Education: A system view* (2nd edition). Belmont, California: Wadsworth.

Moore, M.G. (1973) "Towards a theory of independent learning and teaching", *Journal of Higher Education*, 44(12), p.661-679.

Moore, M.G. (1983) "On a theory of independent study", in D. Stewart, D. Keegan & B. Holmberg (eds.) *Distance Education: International perspectives*. London: Croom Helm.

Moore, M.G. (1989) "Editorial: Three types of interaction", *The American Journal of Distance Education*, 3(2), p.1-6.

Moore, M.G. (1990) "Recent contributions to the theory of distance education", *Open Learning*, 5(3), p. 10-15.

Moore, M.G. (1993) "Theory of transactional distance", in: D. Keegan (Ed.): *Theoretical Principles of Distance Education*. London: Routledge, p.22-38.

Motiwalla, L. & Tello, S. (2000) "Distance learning on the Internet: An exploratory study", *The Internet and higher Education*, 2(4), p.253-264.

Mueller, C. (1997) "Transactional Distance", in *Cyberslang: The ultimate instant online encyclopedia*. Retrieved on 20th May 2006, from http://tecfa.unige.ch/staf/staf9698/mullerc/3/transact.html

Nunnally, J.O. (1978) *Psychometric Theory*. New York: McGraw-Hill.

Odin, J. (2003) "Does e-moderating an active online classroom create?", *On the Horizon*, Vol 11, Issue 1. Retrieved on 20th December 2006, from http://www.sloan-c.org/resources/reviews/pdf/review2.pdf

O'Malley, J., & McCraw, H. (1999) "Students perceptions of distance learning, online learning, and the traditional classroom", *Online Journal of Distance Learning Administration*, 2(4). Retrieved on October 11, 2004, from http://www.westga.edu/~distance/omalley24.html

Open Universities Australia (2006) *Making it Easier to Succeed*. Retrieved on 26 September 2006, from http://www.open.edu.au/wps/portal

Ormrod, J.E. (2000) *Educational Psychology: developing learners* (3rd edn.). Upper Saddle River, N.J.: Prentice-Hall.

OUHK (2006) *Facts & Figures (2005/06)*. Hong Kong: Planning Unit, OUHK.

Pallant, J. (2001) *SPSS Survival Manual: A step by step guide to data analysis using SPSS*. Buckingham: Open University Press.

Palloff, R.M. & Pratt, K. (2001) *Lessons from the Cyberspace Classroom---The reality of online teaching*. San Francisco, CA.: Jossey-Bass.

Pascarella, E., Whitt, A., Edison, M., Hagedorn, L. & Terenzini, P. (1996) "What have we learned from the first year of The national Study of Student Learning?", *Journal of College Student Development*, 37(2), p.182-192.

Paulsen, M. (1995) "Moderating educational computer conferences", in Z. Berge & M. Collins (Eds.) *Computer-mediated Communication and the On-line Classroom in Distance Education*. Cresskill, NJ: Hampton Press.

Paulsen, M. (2003) *E-learnin - The State of the Art.* Retrieved on 24 July 2005, from http://home.nettskolen.nki.no/~morten/E-learning/State%20of%20the%20art.htm

Pawan, F., Paulus, T., Yalcin, S. & Chang, C. (2003) "Online learning: Patterns of engagement and interaction among in-service teachers", *Language Learning & Technology*, 7(3), 119-140. Retrieved on 31 August, 2005, from http://llt.msu.edu/vol7num3/pdf/pawan.pdf

Pearson, J. (2000) "Online learning: Integrating computer conferencing and postgraduate distance education", paper presented at *Australian Computers in Education Conference*, Melbourne, Australia, 6-9 July 2000. Retrieved on 31 August, 2003, from http://www.ictev.vic.edu.au/acec2000/paper_nonref/j-pearson/npaper082.htm

Perse, E., Burton, P., Kovner, E., Lears, M. & Sen, R. (1992) "Predicting computer-mediated communication in a collage class", *Communication Research Reports*, 9(2), p. 161-170.

Peters, L. (2001) "Through the Looking Glass: Student Perceptions of Online Learning", *The Technology Source*, September/October 2001. Retrieved on 3 March 2005, from http://technologysource.org/article/through_the_looking_glass/

Phipps, R., & Merisotis, J. (2000) *Quality on the line: Benchmarks for success in Internet-based distance education*. Blackboard and National Education Association. Retrieved from http://www.ihep.org/

Picciano, A.G. (2002) "Beyond student perceptions: Issues of interaction, presence, and performance in an online course", *Journal of Asynchronous Learning Network*, 6(1), p.21-40. Retrieved on 20 September 2003, from http://www.sloan-c.org/publications/jaln/v6n1/v6n1_picciano.asp

PLS Ramboll Management (2004) *Studies in the Context of the E-Learning Initiative: Virtual Models of European Universities*, draft final report to the EU Commission, DG Education and Culture, Retrieved on 13 December 2006, from http://www.elearningeuropa.info/extras/pdf/virtual_models.pdf

Ralston, J.L. (2003) *E-learning communities- knowledge creation in online conferences: some lessons learnt*, paper presented in the *4th International Conference Information Communication Technologies in Education*. Retrieved on 2 October 2005, from http://www.ineag.gr/iciete/papers2003/Session7/paper22.htm

Raymond III, F. B. (2000) "Delivering distance education through technology: a pioneer's experience", *Campus-Wide Information Systems*, 17(1), p.49-55.

Richardson, J.C. & Swan, K. (2003) "Examining social presence in online courses in relation to students' perceived learning and satisfaction", *Journal of Asynchronous Learning Network*, 7(1), p.68-88. Retrieved on 20 June 2005, from http://www.sloan-c.org/publications/jaln/v7n1/pdf/v7n1_richardson.pdf.

Riffe, D., Lacy, S. & Fico, F. (1998) *Analyzing Media Messages: Using quantitative content analysis in research*. Mahwah, N.J: Erlbaum.

Ritchie, H. & Newby, T. (1989) "Classroom lecture/discussion vs. live televised instruction: A comparison of effects on student performance, attitude, and interaction", *American Journal of Distance Education*, 3, p.36-43.

Rosenthal, R. & Rosnow, R. L. (1991) *Essentials of behavioural research: Methods of data analysis* (2nd Ed.). Singapore: McGraw-Hill.

Rourke , L., & Anderson, T. (2002a) "Exploring Social Communication in Computer Conferencing", *Journal of Interactive Learning Research,* 13(3), p. 259-275.

Rourke , L., & Anderson, T. (2002b) "Using peer teams to lead online discussions", *Journal of Interactive Media in Education,* (1). Retrieved on 3rd August 2003, from: http://www-jime.open.ac.uk/2002/1/rourke-anderson-02-1.pdf

Rourke, L., and Anderson, T. (2004) "Validity in quantitative content analysis", *Educational Technology Research and Development*, 52 (1), p.5-18.

Rourke, L., Anderson, T. Garrison, D. R., & Archer, W. (2001a) "Assessing social presence in asynchronous, text-based computer conferencing", *Journal of Distance Education*, 14(2), 50-71.

Rourke, L., Anderson, T. Garrison, D. R., & Archer, W. (2001b) "Methodological issues in the content analysis of computer conference transcripts", *International Journal of Artificial Intelligence in Education*, 12(1), p.8-22.

Rovai, A. (2002) "Building Sense of Community at a Distance", *International Review of Research in Open and Distance Learning*, 3(1). Retrieved on 20 June 2005, from http://www.irrodl.org/content/v3.1/rovai.html

Rowntree, D. (1974) *Educational Technology in Curriculum Development*. London: Harper & Row.

Rumble, G. (1986) *The Planning and Management of Distance Education*. London: Croom Helm.

Russell, T. L. (1999) *The "No Significant Difference Phenomenon"* (5th edition). North Carolina: North Carolina State University.

Saba, F. & Shearer, R.L. (1994) "Verifying key theoretical concepts in a dynamic model of distance education", *The American Journal of Distance Education*, 8(1), p. 36-59.

Saba, F. (2002) "Evolution of research in distance education: Challenges of the online distance learning environment", keynote paper in the *Second Conference on Research in Distance and Adult Learning in Asia*, June 5-7, 2002, The Open University of Hong Kong.

Salmon, G. (2000) *E-moderating: The key to teaching and learning online*. London: Kogan Page.

Salmon, G. (2003) *E-moderating: The key to teaching and learning online (2nd edition).* London: RoutledgeFalmer.

Saners, J.A. & Wiseman, R.L. (1990) "The effects of verbal and nonverbal teacher immediacy on cognitive, affective, and behavioural learning in the multicultural classroom", *Communication Education*, 39(4), p. 341-352.

Santoro, G. M. (1995) "What is CMC?", in Z. L. Berge & M. P. Collins (Eds.) *Computer Mediated Communication and the Online Classroom. Volume 1: Overview and perspectives.* Cresskill. N.J.: Hampton Press.

Schaefer, D.R. & Dillman, D.A. (1998) *Development of a standard e-mail methodology: Results of an experiment.* Retrieved on 20 Sept, 2002, from http://survey.sesrc.wsu.edu/dillman/papers/E-Mailppr.pdf

Schonlau, M., Fricker, R.D. & Elliot, M.N. (2001) *Conducting research surveys via e-mail and the web.* Retrieved on 17th October 2002, from http://www.rand.org/publications/MR/MR1480/

Schönwetter, D., & Francis, H. (2003) *Student Perceptions of Learning Success with Technology*. McGraw Hill Ryerson. Retrieved on 2 May, 2005, from http://www.mcgrawhill.ca/highereducation/images/allstudents.pdf

Schramm, W. (1977) *Big Media, Little Media*. Beverly Hills, CA: SAGE.

Shale, D. & Garrison, D.R. (1990) "Education and communication". In D.R. Garrison & D. Shale (eds.) *Education at a Distance.* Malabar, FL: Krieger.

Shea, P., Pickett, A., & Pelt, W. (2003) "A follow-up investigation of teaching presence in the SUNY Learning Network", *Journal of the Asynchronous Learning Network*, 7(2). Retrieved on Sept 17, 2003, from http://www.aln.org/publications/jaln/v7n2/v7n2_shea.asp

Shearer, R. (2003) "Instructional design in distance education: An overview", in M.G. Moore and W.G. Anderson (Eds.) *Handbook of Distance Education*. Mahwah, N.J.: Lawrence Erlbaum.

Shin N. (2001) *Beyond Interaction: transactional presence and distance learning.* Unpublished doctoral dissertation, Pennsylvania State University, University Park.

Shin, N. (2002a) "Beyond Interaction: the relational construct of 'Transactional Presence'", *Open Learning*, 17(2), p. 121-137.

Shin, N. (2002b) "Institution's Presence: Its significance to distance learning", *Global E-Journal of Open, Flexible & Distance Education*, 2(1). P.27-36. Retrieved on Nov 17, 2004, from http://www.ignou.ac.in/e-journal/contentsII/Namin%20Shin.htm

Shin, N. (2003) "Transactional Presence as a Critical Predictor of Success in Distance Learning", *Distance Education*, 24(1), p. 69-86.

Shin, N. & Chan, J. (2004) "Direct and indirect effects of online learning on distance education", *British Journal of Educational Technology*, 35(3), p. 275-288.

Short, J. Williams, E., & Christie, B. (1976) *The Social Psychology of Telecommunications*. London: Wiley.

Simonson, M., Smaldino, S., Albright, M. & Zvacek, S. (2003) *Teaching and Learning at a Distance*. Upper Saddle River, N.J.: Pearson Education.

Stein, D., Wanstreet, W., Calvin, J., Overtoom, C., & Wheaton, J. (2005) "Bridging the transactional distance gap in online learning environments", *The American Journal of Distance Education*, 19(2), p. 105-118.

Stevens, J. (1996) *Applied Multivariate Statistics for the Social Sciences* (3rd edition). Mahway, N.J.: Lawrence Erbaum.

Strachota, E.M. (2003) *Student Satisfaction in Online Course: An analysis of the impact of learner-content, learner-instructor, learner-learner and learner-technology interaction*. Unpublished doctoral dissertation, University of Wisconsin-Milwaukee.

Swan, K. & Shih, L.F. (2005) "On the nature and development of social presence in online course discussions", *Journal of Asynchronous Learning Networks*, 9(3). Retrieved on 10 February, 2006, from http://www.sloan-c.org/publications/jaln/v9n3/v9n3_swan.asp

Swan, K. (2001) "Virtual interaction: Design factors affecting students satisfaction and perceived learning in asynchronous online courses", *Distance Education*, 22(20), p.306-331.

Tammelin, M. (1998) "From Telepresence to Social Presence: The Role of Presence in a Network-Based Learning Environment". In S. Tella (Ed.) (1998) *Aspects of Media Education: Strategic Imperatives in the Information Age*. Helsinki: Department of Teacher Education. Retrieved on 4 August, 2005, from http://www.hkkk.fi/~tammelin/MEP8.tammelin.html

Taylor, J.C. (1995) "Distance education technologies: The fourth generation", *Australian Journal of Educational Technology*, 11, 2, 1-7.

Taylor, J.C. (2001) "Fifth generation distance education", keynote address presented at the *20th ICDE World Conference*, Düsseldorf, Germany, 1-5 April 2001. Retrieved on 4 August, 2003, from http://www.fernuni-hagen.de/ICDE/D-2001/final/keynote_speeches/wednesday/taylor_keynote.pdf

Taylor, J.C. (2002) "Teaching and learning online: The workers, the lurkers and the shirkers", keynote address at the *2nd CRIDALA,* June 5-7, The Open University of Hong Kong. Retrieved on 4 June 2003, from http://www.ouhk.edu.hk/CRIDAL/cridala2002/speeches/taylor.pdf

Thomerson, J.D. & Smith, C.L. (1996) "Students perceptions of the affective experience encountered in distance learning courses", *The American Journal of Distance Education*, 10(3), p.37-48.

Tolmie, A & Boyle, J. (2000 "Factors influencing the success of CMC environments in university teaching: A review and case study", *Computer & Education*, vol. 34, p.119-140.

Tsai, S. & Machado, P. (2002) "E-learning, Online Learning, Web-based Learning, or Distance Learning: Unveiling the Ambiguity in Current Terminology", *ELearn Magazine*. Retrieved on 28 September 2006, from http://elearnmag.org/subpage.cfm?section=best_practices&article=6-2

Tsang, Y.M., Choi, M.F. & Tam, K.C. (2002) "Students' participation in computer-mediated communication", in D. Murphy, N. Shin & W. Zhang (Eds) *Advancing Online Learning in Asia*, Hong Kong: Open University of Hong Kong Press.

Tu, C.H. (2000) *An Examination of Social Presence to Increase Interaction in Online Classes*. Unpublished Dissertation in Arizona State University.

Tu, C.H. (2001) "How Chinese perceived social presence: An examination of interaction in online learning environment", *Educational Media International*, 38(1), p. 45-60.

Tu, C.H. & McIdssac. M. (2002) "The relationship of social presence and interaction in online classes", *The American Journal of Distance Education*, 16(3), p.131-150.

Turoff, M. & Hiltz, S. (1995) "Designing and evaluating a virtual classroom", *Journal of Information Technology for Teacher Education*, 4(2), p. 197-215.

UNESCO (1987) "Distance learning systems and structures: Training manual", *Report of a Sub-Regional Training Workshop*, Vol. II, Bangkok.

University of New England (2003) *Principles of online teaching at the UNE*. Retrieved on 1 September 2003, from http://online.une.edu.au/info/guide/principles_online_teaching.htm

Volery, T. & Lord, D. (2000) "Critical success actors in online education", *The International Journal of Educational Management*, 14(5), p.216-223.

Vrasidas, C. (1999) *Being networked: Scholarly reporting in the age of the internet*. Paper presented at the annual meeting of the American Educational Research Association conference, Montreal, Canada.

Vrasidas, C. & McIsaac, M. (1999) "Factors influencing interaction in online course", *American Journal of Distance Education*, 13(3), p.22-36.

Vygotsky, L.S. (1978) *Mind in Society*. Cambridge, MA: Harvard University Press.

Wallace, L. (1996) "Changes in student demographics and motivations", *Journal of Distance Education*, 11(1), p.1–33. Retrieved on 2 May, 2005, from http://cade.icaap.org/vol11.1/wallace.html

Wallen, N. E., & Fraenkel, J. R. (2001) *Educational research: A guide to the process.* Mahwah, NJ: Lawrence Erlbaum.

Walter, J.B. (1992) "Interpersonal effects in computer-mediated interaction: A relational perspective", *Communication Research* 19(1), p. 52-90.

Weber, R.P. (1990) *Basic Content Analysis* (2nd ed.). Newbury Park, CA: Sage.

Webster, J. & Hackley, P. (1997) "Teaching effectiveness in technology-mediated distance learning', *Academy of Management Journal*, 40(6), p.1282-1309.

White, E.M. (1993) "Assessing higher-order thinking and communication skills in college graduates through writing", *The Journal of General Education*, Vol. 42, p.105-122.

Wilkinson, L. (1990) *SYSTAT: The system for statistics*. Evanston, IL: SYSTAT, Inc.

Witmer, B. & Singer, M. (1998) "Measuring presence in virtual environment: A presence questionnaire", *Presence*, 7(3), p. 225-240.

Woo, K.S., Chan, K., Mak, J. & Chan, B. (2002) "Students' attitudes toward an oonline learning environment", in D. Murphy, N. Shin & W. Zhang (Eds) *Advancing Online Learning in Asia*, Hong Kong: Open University of Hong Kong Press.

Wright, D.B. (1997) *Understanding Statistics: An introduction for the social sciences.* London: SAGE.

Wulf, K. (1996) "Training via the Internet: Where are we?", *Training and Development*, 50(5), p.50-55.

Yacci, M. (2000) "Interactivity demystified: A structural definition for distance education and intelligent computer-based instruction", *Educational Technology*, 40(4), p.5-16.

Appendices

Appendix 1: Transformation of indicators to questionnaire items

Table i: Items for cognitive presence in the preliminary questionnaire

Phase	Descriptor	Indicators	Relevant items in Questionnaire
Triggering event	Evocative (inductive)	Recognize problem	Participants' messages evoke meaningful questions.
		Puzzlement	Participants raise meaningful questions.
Exploration	Inquisitive (divergent)	Divergence	Participants provide divergent views in discussions.
		Information exchange	Participants share their own views and ideas.
		Suggestions	Participants provide useful ideas to the questions raised.
		Brainstorming	Strategy of brainstorming is used in the discussion.
		Intuitive leaps	Participants offer intuitive yet unsupported opinions.
Integration	Tentative (convergent)	Convergence- among group members	Participants build up their own arguments on the basis of other messages.
		Convergence – within a single message	Participants develop and justify their own hypotheses in their messages.
		Synthesis	Participants try integrating various sources of information.
		Creating solutions	Participants give solutions to questions explicitly.
Resolution	Committed (deductive)	Vicarious application to real world	Participants try applying or testing a solution in real world situations.
		Testing solutions	
		Defending solutions	Participants defend their ideas or solutions.

*Note : "Participants" here includes instructor and fellow learners

Table ii: Items for social presence in the preliminary questionnaire

Category	**Indicators**	**Relevant items in Questionnaire**
Affective responses	Expression of emotion	Participants express emotion in their messages.
	Use of humour	There is a sense of humour in the messages.
	Self-disclosure	Participants share personal information or details of life not directly related to class.
Open communication	Continuing a thread	Participants respond to other messages.
	Quoting from others' messages	Participants quote others' messages during discussion.
	Referring explicitly to others' messages	Participants refer to others' messages explicitly.
	Asking questions	Participants ask questions of their instructor or other students.
	Complimenting, expressing appreciation	Participants compliment others' messages.
	Expressing agreement	Participants express agreement with others' messages.
Cohesive responses	Vocatives	Participants address or refer to others by name.
	Addresses or refers to the group using inclusive pronouns	Participants address the whole group /class as "we", "us" or "our".
	Phatics, salutations	Participants write messages for purely social functions, like greetings.

*Note : "Participants" here includes instructor and fellow learners

Table iii: Items for teaching presence in the preliminary questionnaire

Category	Indicators	Relevant items in Questionnaires
Instructional design and organization	Setting curriculum	The tutor (or course coordinator, the same below) sets the theme for a discussion.
	Designing methods	The tutor arranges how the discussion is conducted.
	Establishing time parameters	The tutor sets a time limit for a discussion.
	Utilizing medium effectively	The tutor gives advice on the use of the discussion board.
	Establishing netiquette	The tutor sets basic rules of online discussions.
	Making macro-level comments about course content	The tutor states the relation between the discussion and the course content.
Facilitating discourse	Identifying areas of agreement/disagreement	The tutor highlights areas of agreement and /or disagreement among students.
	Seeking to reach consensus/ understanding	The tutor helps in reaching consensus / understanding.
	Encouraging, acknowledging, or reinforcing student contributions	The tutor makes positive responses to students' participation.
	Setting climate for learning	The tutor helps in setting a good climate for learning.
	Drawing in participants, prompting discussion	The tutor invites contributions/ participation in discussions.
	Assessing the efficacy of the process	The tutor evaluates the efficacy of the discussion.
Direct instruction	Present content/ questions	The tutor presents teaching content or guiding questions.
	Focus the discussion on specific issues	The tutor focuses the discussion on a specific issue.
	Summarize the discussion	The tutor summarizes the discussion.
	Confirm understanding through assessment and explanatory feedback	The tutor confirms understanding through assessment and explanatory feedback.
	Diagnose misconception	The tutor diagnoses misconceptions in messages.
	Inject knowledge from diverse sources, e.g., textbook, articles, Internet, personal experiences (includes pointers to resources)	The tutor brings in knowledge from various sources, e.g. study units, set book, readings, web pages, among others.
	Responding to technical concerns	The tutor provides technical support in the online discussion platform.

Appendix 2: Questionnaire for the main survey

English Version

Students Questionnaire: Use of Discussion Board

Section A: Background information

1. Course Code: [Autofill]

2. Gender: □ male □ female

3. Age group: □ 17-27 □ 28-37 □ 38-47
□ 48-57 □ 58 or above

4. Internet connection: □ 28.8K/ 56K modem □ Broadband service
□ No idea

5. Computer / Internet proficiency: □ Beginner □ Intermediate □ Expert

6. No. of courses with OLE support taken at OU: (NOT including the course/s you are now doing)
□ Nil □ 1 □ 2 □ 3 or more

Questions 7 through 62 refer to your own experience of the discussion board in [course code].

Section B: Experience on the discussion board in OLE

Please read the following description carefully, and determine the frequency of its occurrence in the discussion board messages you have read ***from January 2006 to now.***

		Never				Frequently
7.	Participants' messages evoke meaningful questions. (*"Participants" here includes tutor and other learners, the same below.*)	1	2	3	4	5
8.	Participants raise meaningful questions.	1	2	3	4	5
9.	Participants provide divergent views in discussions.	1	2	3	4	5
10.	Participants share their own views and ideas.	1	2	3	4	5
11.	Participants provide useful ideas to the questions raised.	1	2	3	4	5
12.	Strategy of brainstorming is used in the discussion.	1	2	3	4	5
13.	Participants offer intuitive yet unsupported opinions.	1	2	3	4	5
14.	Participants build up their own arguments on the basis of other messages.	1	2	3	4	5
15.	Participants develop and justify their own hypotheses in their messages.	1	2	3	4	5

16.	Participants try integrating various sources of information.	1	2	3	4	5
17.	Participants give solutions to questions explicitly.	1	2	3	4	5
18.	Participants try applying or testing a solution in real world situations.	1	2	3	4	5
19.	Participants defend their ideas or solutions.	1	2	3	4	5

		Never				Frequently
20.	Participants express emotion in their messages.	1	2	3	4	5
21.	There is a sense of humour in the messages.	1	2	3	4	5
22.	Participants share personal information or details of life not directly related to class.	1	2	3	4	5
23.	Participants respond to other messages.	1	2	3	4	5
24.	Participants quote others' messages during discussion.	1	2	3	4	5
25.	Participants refer to others' messages explicitly.	1	2	3	4	5
26.	Participants ask questions of their instructor or other students.	1	2	3	4	5
27.	Participants compliment others' messages.	1	2	3	4	5
28.	Participants express agreement with others' messages.	1	2	3	4	5
29.	Participants address or refer to others by name.	1	2	3	4	5
30.	Participants address the whole group /class as "we", "us" or "our".	1	2	3	4	5
31.	Participants write messages for purely social functions, like greetings.	1	2	3	4	5

		Never				Frequently
32.	The tutor (or course coordinator, the same below) sets the theme for a discussion.	1	2	3	4	5
33.	The tutor arranges how the discussion is conducted.	1	2	3	4	5
34.	The tutor sets a time limit for a discussion.	1	2	3	4	5
35.	The tutor gives advice on the use of the discussion board.	1	2	3	4	5
36.	The tutor sets basic rules of online discussions.	1	2	3	4	5
37.	The tutor states the relation between the discussion and the course content.	1	2	3	4	5
38.	The tutor highlights areas of agreement and /or disagreement among students.	1	2	3	4	5

39.	The tutor helps in reaching consensus / understanding.	1	2	3	4	5
40.	The tutor makes positive responses to students' participation.	1	2	3	4	5
41.	The tutor helps in setting a good climate for learning.	1	2	3	4	5
42.	The tutor invites contributions/ participation in discussions.	1	2	3	4	5
43.	The tutor evaluates the efficacy of the discussion.	1	2	3	4	5
44.	The tutor presents teaching content or guiding questions.	1	2	3	4	5
45.	The tutor focuses the discussion on a specific issue.	1	2	3	4	5
46.	The tutor summarizes the discussion.	1	2	3	4	5
47.	The tutor confirms understanding through assessment and explanatory feedback.	1	2	3	4	5
58.	The tutor diagnoses misconceptions in messages.	1	2	3	4	5
49.	The tutor brings in knowledge from various sources, e.g. study units, set book, readings, web pages, among others.	1	2	3	4	5
50.	The tutor provides technical support in the online discussion platform.	1	2	3	4	5

Section C: Attitude Towards the Use of the Discussion Board in the OLE

Please read each statement carefully, and indicate the degree of Disagreement / Agreement with the statement as it relates to your attitude towards the use of discussion board in course code.

		Strongly disagree				Strongly agree
51.	I would recommend the use of the discussion board to new students at OUHK.	1	2	3	4	5
52.	I would utilise the discussion board in my next course in OUHK.	1	2	3	4	5
53.	The discussion board provides adequate chances of communication between my tutor and I.	1	2	3	4	5
54.	Participating in the discussion board is a valuable experience for me.	1	2	3	4	5
55.	I am satisfied with the functioning of the discussion board in the OLE.	1	2	3	4	5

Section D: Efficacy of Discussion Board

Please read each statement carefully, and indicate the degree of Disagreement / Agreement with the statement as it relates to your attitude towards the use of discussion board in course code.

		Strongly disagree				Strong agree
56.	With the support of the discussion board, I can learn effectively.	1	2	3	4	5
57.	My interest in the subject matter has been stimulated by the discussion board in my course.	1	2	3	4	5
58.	I have been able to learn more by participating in the discussion board.	1	2	3	4	5
59.	I gained useful knowledge / ideas / information for my study through the discussion board.	1	2	3	4	5
60.	The discussion board enhanced my thinking skills.	1	2	3	4	5
61.	The discussion board allowed me to look at things in different ways.	1	2	3	4	5

62. Please write in the following box your opinions towards the use of **Discussion Board** in Course code.[1]

<End of Questionnaire>

And thank you once again for participating in this research project

Submit

[1] In the questionnaire for pilot survey, the last open-ended question was omitted.

Chinese Version

學生問卷：討論區的使用

甲部：個人資料

1. 科目編號 [　　]

2. 性別： ☐ 男 ☐ 女

3. 年齡組別： ☐ 17-27 ☐ 28-37 ☐ 38-47 ☐ 48-57 ☐ 58 或以上

4. 網絡連接方式： ☐ 28.8K / 56K 數據機 ☐ 寬頻網絡 ☐ 不清楚

5. 電腦 / 網絡技術水平 ☐ 初學者 ☐ 熟練 ☐ 專家級

6. 除現正修讀的科目以外，你在公開大學已完成的學科中，曾有多少科使用過網上學習系統（OLE）？

☐ 無 ☐ 1 ☐ 2 ☐ 3 個或以上

請以修讀[科目編號]時使用網上討論區的經驗來回答第 7 至 62 題。

乙部：使用討論區的經驗

請細讀以下關於討論區發言的描述，並指出在 2006 年 1 月至今出現所述情況的頻密程度。

		從不				經常
7.	參與者（*包括導師和同學，下同*）的發言能引發有意義的問題。	1	2	3	4	5
8.	參與者提出有意義的問題。	1	2	3	4	5
9.	參與者在討論中提供多元化的觀點。	1	2	3	4	5
10.	參與者分享自己的觀點和意見。	1	2	3	4	5
11.	參與者對別人的問題提出回應/建議。	1	2	3	4	5
12.	討論中用到了腦力激盪法（Brainstorming）的策略。	1	2	3	4	5
13.	參與者樂意提供尚未成熟的意見。	1	2	3	4	5
14.	參與者參考別人的信息內容以建立自己的論點。	1	2	3	4	5
15.	參與者提出自己的假設，並加以證明。	1	2	3	4	5
16.	參與者將不同的資料作出整合。	1	2	3	4	5
17.	參與者爲別人的問題提供答案。	1	2	3	4	5
18.	參與者將別人提出的答案放在真實處境中作檢驗。	1	2	3	4	5
19.	參與者爲自己的意見或答案辯護。	1	2	3	4	5

		從不				經常
20.	參與者在信息中會流露自己的情感。	1	2	3	4	5
21.	信息內容中帶有幽默感。	1	2	3	4	5
22.	參與者分享與學科內容無直接關係的個人資訊。	1	2	3	4	5
23.	參與者回應他人的信息。	1	2	3	4	5
24.	參與者在討論中直接引錄他人的信息內容。	1	2	3	4	5
25.	參與者在發言時提及他人的信息內容。	1	2	3	4	5
26.	參與者直接向其他同學或導師提問。	1	2	3	4	5
27.	參與者表揚/稱讚/多謝別人的信息。	1	2	3	4	5
28.	參與者對別人的信息表示贊同。	1	2	3	4	5
29.	參與者在提及別的學員時，以其名字相稱。	1	2	3	4	5
30.	參與者在提及全班/組同學時會用“我們”作主語。	1	2	3	4	5
31.	信息內容純屬社交性質（如問候、祝賀等）。	1	2	3	4	5

		從不				經常
32.	導師會訂定討論的主題。	1	2	3	4	5
33.	導師會爲網上討論作出安排。	1	2	3	4	5
34.	導師會爲討論定下時限。	1	2	3	4	5
35.	導師會爲討論區的使用方法提供建議。	1	2	3	4	5
36.	導師爲網上討論訂下基本規則。	1	2	3	4	5
37.	導師指出討論內容與本科的關係。	1	2	3	4	5
38.	導師提出學員間相同或/及相異的觀點。	1	2	3	4	5
39.	導師幫助學員在討論中互相諒解或達至共識。	1	2	3	4	5
40.	導師對學員的參與作出正面的回應。	1	2	3	4	5
41.	導師爲網上討論營造良好的學習氣氛。	1	2	3	4	5
42.	導師邀請學員發表意見/積極參與。	1	2	3	4	5
43.	導師評估 / 評價討論的成效。	1	2	3	4	5
44.	導師在網上講授與學科有關的內容或提出引導性問題。	1	2	3	4	5
45.	導師將討論的焦點集中在某個特定的課題。	1	2	3	4	5
46.	導師總結討論的內容。	1	2	3	4	5
47.	導師利用考核或回饋來確定學員能夠掌握某些內容。	1	2	3	4	5
48.	導師診斷出學員信息中所含的誤解。	1	2	3	4	5
49.	導師在討論中引入其他資料（如單元、教科書、文章、網頁等）以引進新知識。	1	2	3	4	5
50.	導師爲學員提供網上討論區的技術支援。	1	2	3	4	5

丙部：對使用討論區所持的態度

細閱以下對使用網上討論區所持態度的描述，並根據 course code 的經驗表示你對此的同意程度。

		非常不同意				非常同意
51.	我會建議新同學多利用公開大學的網上討論區。	1	2	3	4	5
52.	我會在修讀下一個科目時使用網上討論區。	1	2	3	4	5
53.	討論區爲我和導師提供了足夠的溝通機會。	1	2	3	4	5
54.	參與網上討論對我而言是有價值的經驗。	1	2	3	4	5
55.	我對公開大學網上討論區的功能感到滿意。	1	2	3	4	5

丁部：使用討論區的學習效果

細閱以下對使用網上討論區所持態度的描述，並根據 course code 的經驗表示你對此的同意程度。

		非常不同意				非常同意
56.	我覺得配合網上討論的支援，我在本科的學習很有成效。	1	2	3		4
57.	透過參與網上討論，我對本科的學習興趣有所提高。	1	2	3		4
58.	透過參與網上討論，我可以學得更多。	1	2	3		4
59.	透過參與網上討論，我可以得到有用的知識/意見/資料來幫助學習。	1	2	3		4
60.	參與網上討論，對我的思考能力有所提升。	1	2	3		4
61.	參與網上討論，讓我可以從不同角度理解事物。	1	2	3		4

62. 如對使用 course code 的討論區有任何意見，請填寫在以下空格。

<問卷完>

衷心多謝你抽空完成這份問卷！

送出

Appendix 3: Informed consent letter

Dear Student,

Hi, this is Henry Choi, a Course Designer in the Educational Technology and Publishing Unit of the OUHK. I am now conducting an online survey evaluating the use of discussion boards in the Online Learning Environment (OLE) in OUHK, which is an essential part of my doctoral dissertation through the University of Durham.

The questionnaire, consisting of 61 items[2], seeks information on **your learning experience with discussion boards** in the OLE. It should take you about 10 minutes to respond to this online questionnaire.

Your participation is completely voluntary, but it is vital to the study I am now engaged in, and valuable to the further development of the online learning support in OUHK. If you do participate, I assure you that **your responses will be confidential and your anonymity will be studiously protected**, and data collected will be used solely for the purposes of this study. At no time will the data be examined individually, nor will any attempt be made to compare individual students.

Thanks for your time and participation. It is very much appreciated. Should you have any questions or comments concerning this survey, please contact Mr. Henry Choi, Course Designer in OUHK, via email: mfchoi@ouhk.edu.hk.

Sincerely yours,

_____

Henry Choi

ETPU, OUHK

If you have read the above information, and would like to continue with the survey, please check "Continue".

Continue

[2] There are 61 items in the pilot survey and 62 items in the main survey.

Informed consent letter (Chinese Version)

各位同學：

你好，我是蔡明輝，公開大學教育科技出版部的教學設計主任。本人現正進行一項網上調查研究，探討本校網上學習平台中「討論區」（Discussion Board）功能的使用情況，而這將會是本人在英國杜倫大學（University of Durham）的教育博士論文的主要部分。

本問卷共有題目 61 條，大約只需十分鐘左右便可以完成，內容是環繞你**使用本校網上討論區的學習經驗**。

回答本問卷純屬自願性質，但你的協助不單對本人的研究論文至爲重要，對於本校網上學習支援的使用和發展，亦甚具參考價值。**此網上問卷以不具名方式發放及回收，一切資料將會絕對保密，亦只供本人是次研究之用。任何回應者所提供的資料均不會作獨立處理，亦不會個別與其他學員作出比較。**

對閣下的撥冗幫忙，本人深表謝意。如對是次調查研究有任何疑問或意見，歡迎以電郵與本人聯絡：mfchoi@ouhk.edu.hk.

順祝 學業進步

蔡明輝謹上

香港公開大學教育科技出版部

如你已經細閱以上資料，並同意參與是次調查，請按“繼續”，即可開始作答。

繼續

Appendix 4: Result of content analyses in the pilot study

Table i: Result of Content analysis of Cognitive Presence

Phase	Indicator	Course A	Course B	Course C	Course D
Triggering event	Recognize problem	6	4	8	4
	Puzzlement	3	5	5	1
	Sub-total	9	9	13	5
Exploration	Divergence-within the online community	6	2	8	0
	Divergence-within a single message	2	3	4	0
	Information exchange	3	2	8	2
	Suggestions for consideration	4	2	3	4
	Brainstorming	0	0	1	0
	Intuitive leaps	1	0	2	0
	Sub-total	16	9	26	6
Integration	Convergence- among group members	3	2	2	0
	Convergence- within a single message	2	3	6	1
	Connecting ideas, synthesis	1	0	2	0
	Creating solutions	1	1	2	0
	Sub-total	7	6	12	1
Resolution	Vicarious application to real world	2	4	1	0
	Testing solutions	0	0	3	0
	Defending solutions	0	2	2	0
	Sub-total	2	6	6	0
	Grand Total	**34**	**30**	**57**	**12**

Table ii: Result of Content analysis of Social Presence

Category	Indicators	Course A	Course B	Course C	Course D
Affective responses	Expression of emotion	3	5	14	1
	Use of humour	8	2	19	2
	Self-disclosure	2	2	8	0
	Sub-total	13	9	41	3
Open communication	Continuing a thread	27	18	41	6
	Quoting from others' messages	10	6	16	2
	Referring explicitly to others' messages	5	3	11	1
	Asking questions	18	16	22	6
	Complimenting expressing appreciation	6	4	6	2
	Expressing agreement	5	3	7	1
	Sub-total	71	50	103	18
Cohesive responses	Vocatives	1	3	6	4
	Addresses or refers to the group using inclusive pronouns	5	4	10	3
	Phatics, salutations	3	4	6	1
	Sub-total	9	11	22	7
	Grand Total	**93**	**70**	**166**	**28**

Table iii: Result of Content analysis of Teaching Presence

Category	Indicators	Course A	Course B	Course C	Course D
Instructional design and organization	Setting curriculum	1	1	0	0
	Designing methods	1	0	1	0
	Establishing time parameters	0	0	0	0
	Utilizing medium effectively	0	1	2	0
	Establishing netiquette	0	1	0	0
	Making macro-level comments about course content	2	1	2	1
	Sub-total	4	4	5	1
Facilitating discourse	Identifying areas of agreement/disagreement	1	0	0	1
	Seeking to reach consensus/ understanding	1	1	0	0
	Encouraging, acknowledging, or reinforcing student contributions	3	2	2	1
	Setting climate for learning	2	1	0	0
	Drawing in participants, prompting discussion	1	2	4	0
	Assessing the efficacy of the process	0	0	2	0
	Sub-total	8	6	10	2
Direct instruction	Present content/ questions	4	3	4	2
	Focus the discussion on specific issues	2	0	1	0
	Summarize the discussion	0	0	1	0
	Confirm understanding through assessment and explanatory feedback	0	0	0	0
	Diagnose misconception	2	1	3	0
	Inject knowledge from diverse sources, e.g., textbook, articles, Internet, personal experiences (includes pointers to resources)	2	2	0	0
	Responding to technical concerns	0	2	0	0
	Sub-total	10	8	9	2
	Grand Total	**22**	**18**	**24**	**5**

Appendix 5: Response rate in the main survey

School	Course code	No. of students	No. of respondents	No. of active respondents[1]	Valid Response rate (%)
A&SS	AC361C	27	1	0	0.00
	AC371C	35	2	2	5.71
	B230	104	17	15	14.42
	EC203	26	2	2	7.69
	A202	64	7	6	9.38
	AC200C	49	5	5	10.20
	AC352C	38	2	1	2.63
	SS112C	53	9	8	15.09
	DSE212	27	6	5	18.52
	ED209	32	2	2	6.25
	B230C	65	13	11	16.92
	AC270C	35	3	2	5.71
	AC273C	52	5	4	7.69
	AC274C	33	5	3	9.09
	AC360C	46	6	5	10.87
B&A	B410	26	1	0	0.00
	B891	40	3	0	0.00
	B898	31	3	3	9.68
	B351C	23	2	2	8.70
	B892	51	11	11	21.57
	B260C	60	12	10	16.67
	B261C	34	5	3	8.82
E&L	E817	48	5	3	6.25
	E210C	68	4	3	4.41
	E811C	96	25	22	22.92
	E311C	28	2	2	7.14
	E805C	26	0	0	0.00
S&T	NU202C	48	22	3	6.25
	S310	28	2	2	7.14
	U216	11	1	1	9.09
	NU310	20	1	0	0.00
	MT260	51	10	9	17.65
	MT356	42	13	12	28.57
	MT888	35	5	5	14.29
	Total	1452	212	162	11.16

Note 1: "Active respondents" were those who had read at least 10 conference messages in 6 months.

Appendix 6: Responses in the open-ended question

The last question in the questionnaire was an open-ended question investigating students' opinions towards the online conference in the OUHK. The following shows all the responses of the last question. Some of the respondents were written in Chinese and the translation is printed in italic. Original Chinese paragraph is also presented for reference.

1. The following opinion is towards my experience of the discussion board in the 16 courses that I have studied at OU, but not MT356 in particular: The efficacy of the discussion board strongly depends on the degree of participation of both the teaching staffs (tutors and CCs) and the students. In the 16 courses that I have taken at OU, I would say that in only 1/3 of them, the teaching staffs' participation is satisfactory; 1/3 of them are only fair; and 1/3 of them are simply disappointing. In all courses, the discussion board is seldomly used for real discussion, but only as a Q&A platform, where the students ask questions and the teaching staffs answer. The teaching staffs never raise any question for the purpose of initiating real discussion among the students. Sometimes good discussion happens among the students, but the teaching staffs almost never offer any constructive comment along the way and conclusive summary at the end (they just "disappear" when students are "arguing" about some topic). I think the OLE discussion board has only been used as a convenient means of communication among the participants (but not necessarily effective because in many courses the responses from the teaching staffs are rather disappointing). It is no use however good the discussion platform is (actually the platform is not very good compared with the previous WebCT) if the participants are not using it actively and appropriately.

2. The discussion board is not powerful as expected. It is better to support real time discuss form time to time. For exapmle, using a MSN messagener to hold a group of discussion for a specific topic for certain period. Other than the text format, it is better to support video and sound clips for participants to express their idea.

3. It is useful whenever it it useful. It realyy depends on the CC's management. Our discussion Board this time seems cool as it provide a platform for use to share informations and tutor respons to . But if it comes to something call discussion, other students may not raise voice. This is Hong Kong, a typical Chinese culture.

4. May I have the function to express question and reply with the sound track that I can learn clearly.

5. I attended courses, which have a lot more active participation. But I believe that is due to the larger numbers of students taking that course and there are a few students/tutors/cc actively engaged in the discussions.

6. Tutor's support is very importnat in using the discussion board. If there only discussion between students and we can't find a way to slove problem, tutor or CC has their responsibility to guide student to slove the problem. I had such experience (not this course) that no tutor or CC to answer students' questions within the discussion board. The reason is that those tutor said "discussion board is for student to find the answer within themselves"

7. able send TMA through OLE system likes b121, b260...etc set surgery of B230 (a 10 credits course)

8. Find that the course mates are not active in the public forum of B230.

9. In MT260 or other courses, when I post the question to OLE, the estimate average tutor response time is about 6 hours. If one tutor answer me the question and I have further question want to ask, the tutor replies me on next day and other tutors don't participate to our discussion because they think it is the responsibility of tutor who replied me. So, if I have further question that need the tutor follow up. It need to wait at least 1 day to get the response. It is not efficient toward my study. The OLE function should be enhanced. i.e. a drawing function should be included because some question cannot be expressed in pure text. I wish we could show the image with the text together rather than attachment. It could be more interactive I though. It will be great if the tutors and CC check OLE several times a day. My contact number is xxxxxxxx[3], feel free to contact me to discuss further.

10. The tutor is generally not equipped enough knowledge to answer some practical question related to Economics.

11. It will help the student more if the relevant questions and answers can be grouped under different topic floders so that the materials can be easily retrieved. Can the mails can be 'deleted' say once a month to enhance the efficiency?

---

[3] Private telephone number is hidden.

12. *It seems to have been abused. Students posted messages unrelated to the course.*

    似乎有點濫用了，發表了與課程無關的東西.

13. It is not widely used. Participants only use it as a communication channel and not as a discussion board. Tutor uses it to distribute pre-class handouts etc., reminders to TMA etc. Tutors should take the lead in raising issues and hands-on experience/practices in discussion board. For example, each tutor should take turn to monitor the discussion board and raise questions for discussion and invite opinions from students. It seems that there is a lack of communication between tutuors. Basically, there is not sufficient use by tutors other than as an email box function. There is no need or nothing surprise you to open the discussion board other than to download pre-class materials. The only OLE discussion board I found useful is the Economics course - stimulating discussion.

14. In discussion board B891, it is seldom of participant to raise the question for discussion. In other course I studies before, like B825, the tutor will give us some open question and let us think about it and more participant are willing to share their ideas. Also, the tutor will keep in track to further questioning or feedback according to the student opinion. Intergroup tutor and students will join together also. It allows us to learn progressively. I think, for B891, the tutor can try to do more in this area.

15. *Neither students nor tutors discussed course related issues in the discussion board.*

    沒有同學或導師在討論區內討論有關 nu202c 的問題！

16. *Some students often made unreasonable complaints and other students dared not say anything.*

    有同學經常作出不合理之投訴，引致同學不敢發言。

17. It enhances the communications between tutors and students. It is presumed that students can get the prompt response from the tutor in-charge. The discussion board can make the students to learn more that is out of study materials and books.
18. The topics in discussion borads is suitable and is not out of the area of A202.

19. Since the CC, tutors and students are very proactive in using the discussion broad. I appreciate the quick responses from CC and tutors. It makes the discussion

board as a very useful tool for course MT888. It leads to the consequence for stimulating me and other students to use it more frequently.

20. *I wish our tutors could integrate commercial laws with the reality in our learning, and gave us powerpoint presentation in the discussion board. This will save us from many troubles and we can learn more efficiently.*

我真心希望我們的導師能將學習和現實中的商業法結合起來，並在討論區給予一定的 power point 的指導我們，讓我們在學習中少走彎路，以達事半功倍的效果。

21. The discussion broad of B892 provides me the chance to form a self-study group with students from various tutorial groups. Besides, there is a group project in B892. I found I have learnt more from the connection with other students (we may use email for more detailed communication). Comparatively, the discussion broad is not so active. Overall speaking, the discussion broad is very useful that provide the channel for meeting others. Then, further connection can be going on. Besides, it is a very good media for acquire knowledge and information that contributed by tutors from other groups.

22. It provided an efficient way to communication with student fellows, tutors, and CC.

23. *No students or tutors actually use the discussion board after 01/01/06. The difficulties in this course could not be expressed easily in words, not even in a face-to-face communication. That may be why no one spend time in the discussion board.*

此討論區於 01/01/06 後沒有任何導師或學生使用，此科學習上出現的困難，很難以文字表達，即使面對面溝通也會不明白，所以討論區沒有人使用。

24. *In general, few students make use of the discussion board to discuss course-related issues.*
普遍同學較少用討論區，討論課題上的問題或相關資訊

25. If tutors or course-mates do not participate in the discussion board of B261C, we can join the discussion forum for OU students in public domain. There are more readers and replies, and is much better and more interesting than that of B261C.

http://www1.discuss.com.hk/forumdisplay.php?fid=201&page=1

如果導師/同學不參與 B261C 討論, 同學大可以在外間的討論區進行, 而收看人數和回覆的師兄師姐, 比起單單在 B261C 討論區之中有用得多，有趣得多
http://www1.discuss.com.hk/forumdisplay.php?fid=201&page=1

26. *There are few people showing up in this course.*
本科很冷

27. I wish c.c. and tutors provide their opinions with easiness, sometimes we could not understood.

28. If there is real-time interactive tool such as chat room, the efficiency will be better.
如果可以加上類似即時對話的功能，例如聊天室等，效果可能更好。

29. Coursmates' participation rate is low, and tutor did not post questions.
同學的參與度不足，導師少有提發問題

30. It will be nice if course coordinator and tutors can post more questions for discussion.
學科主任及各組導師若能主動在網上提出思考性問題給大家討論會更好!

31. Until now, participants in the discussion board of AC274C are few. The amount of information we can get in the discussion board relies on students' active participation.
到目前爲止，AC274C 在討論區參予討論的同學並不多，在討論區能否獲得資訊，也很依賴那科的同學是否肯透過討論區積極發言！

32. *There are 4 tutors in my course, but only one of them is willing to help the students via the discussion board. All the other three just did not show up! Some students are just promoting themselves in the board. It is not useful and even make one scunner.*
本科共有 4 組導師，但只有第 1 組導師願意爲學生服務，其餘的都不會發表，十分失望 另外：有些同學常常在討論區 hardsale 自己,既無建設性，亦令人反感!!

33. *There are too few students make use of it. Sometimes I just wonder if my mail box is out of order.* 很少同學用.有時懷疑自己郵箱是否壞了呢??

34. There are too few tutor s and students using the discussion board, so it is not that useful. It is also more difficult to speak in text. There are always a couple of tutors who make response, but no students make reply or discuss.

太少同學和導師使用,所以沒有甚麼實際得益,使用文字談話,比較煩,亦難於表達全部意見.表達後只有來來回回兩三位導師回應,沒有甚麼同學回應,或加入討論.

35. *Among the 4 tutors and course coordinator, only one of them replied to students' questions. They are not caring enough. It may be the reason why students are not interested to participate in the discussion board.*

在四位導師及學科主任中，只有一位導師回覆同學提問，未能顯出導師對學員的溫暖感！ 可能是這個原因，令同學沒有興趣在網上提問及討論！

36. *The guys who actively participate in the discussion board are those who know each other.*

討論者往往是一班互相認識的同學

37. The discussion board's idea is good. However, I dun see much discussion on the topics of the Subject. 90% are mainly focus on TMA only, I', curios that is that the main idea of discussion?

38. I found that most of the students are not keen to share their ideas on discussion board. They rather to be a watcher than participant. Motivation is a problem.

39. To enhance the function of the discussion board as a forum instead of just a platform for tutors to post their tutorial notes, I think it is helpful if the Course Coordinator can post some controversial topics from time to time as a means of stimulating students' participation in discussion.

40. *I did not post any messages myself, but read others. I find it is still useful, so I agree discussion board is good learning aids.*

本人沒參與討論，但經常瀏覽網上討論區，也覺得益不少，所以我同意網上討論是學習的好幫手。

41. No opinions at this moment.

42. Due to the information given in the Discussion Board, it would supply the positive information and correct the mistake that I have, so I strongly recommend

that Discussion Board continue be posted at OLE.

43. I was disappointed by the number of participants, albeit a fully fuctional platform provided.

44. *Starting from my master degree course, we are supported by discussion board. It is quite good. I learn from reading other messages. A few years ago, when we did not have discussion board, we could only call our tutors by phone. So discussion board is good and should keep on developing.*

讀碩士課程開始，有討論區，覺得很不錯，看到討論的內容，也會加深討論的問題的認識；在最幾年前修讀學士課程的時候還未有討論區，只能致電導師請教他們，所以，討論區是有必要繼續，並要愈做愈好，愈完善！

45. *There should be at least some comprehensive exercises in the course materials for students' reference. These kind of exercises are not common in other texts.*

在教材方面，應該多多少少都要有一題半題詳細的計算題混合文字題的題目示範，等學生可以多作參考。因爲這些題目就算從其他書藉方面都較難查閱。

46. It's better to separate the borad in different topics, such as "about TMA", "general concept", and so on.

47. *Just like what we have in OU web-mail, there should be reminding notices when there is new postings, so we don't have to check OLE every time.*
與 OU 電郵一樣，如討論區有新訊息，可以電郵通知，不需每次也要登入 OLE 查看。

48. If I can spend more time in using the Discussion Board, I think I will benefit more.

49. *The downloading speed is very slow. Tutor guidance is very important. Discussion board in my last year course "Selected Poems" was very successful, because our tutor actively participated. We learnt a lot!*
下載速度很慢,導師的引導和參與很重要. 去年詩選因有導師的積極參與而非常成功 學員獲益不淺

50. It provides an other mean for us to communicate with each others. The responses enable me not to have the lonely feeling during the long study periods.

51. *AC200C is a Putonghua course. Besides the basic linguistic features, the most important is oral presentation. But OLE cannot provide direct help in difficulties in pronunciation.*
由於 AC200C 是學習普通話, 除基本認知, 如拼音及語法, 最重要還是口語表達, 即語音. 如遇到語音上的困難, 網上學習就不能直接提供解決方法.

52. *It is better to upgrade OLE to something with synchronous communition features, like MSN or ICQ, and it can increase interest of learning or discussion.*
最好將網上討論系統改到如 MSM 或 ICQ 可即時回應功能。因可加強學習及討論的興趣。

53. *The discussion board of EC203 is a total failure! It takes up to half a month to wait for reply to a question. Course-mates simply did not participate in discussion board. My experience in the discussion board of MDST242 from 4/05-3/06, the discussion was very hot. Students share, tutor replies, and even course coordinator gives guidance. That is what we expected. As questions were responded, the discussion board is useful. But the discussion board of EC203is a waste of resources, as I says above.*
若以 EC203 的討論區而言，非常失敗。從問題提出至有回應等至半個月,且同學亦不熱衷於討論區。但以本人於 MDST242 之 4/05-3/06 期間，討論區情況可謂非常熱鬧。有同學間之交流，有 Tutor 之回應，甚至 CC 之引導，同學們正正表現出 OU 對討論區之期望，亦看到同學們提問之答覆，故十分有效用。但 EC203 的討論區則有感浪費，原因可能從上文能略知一二??!

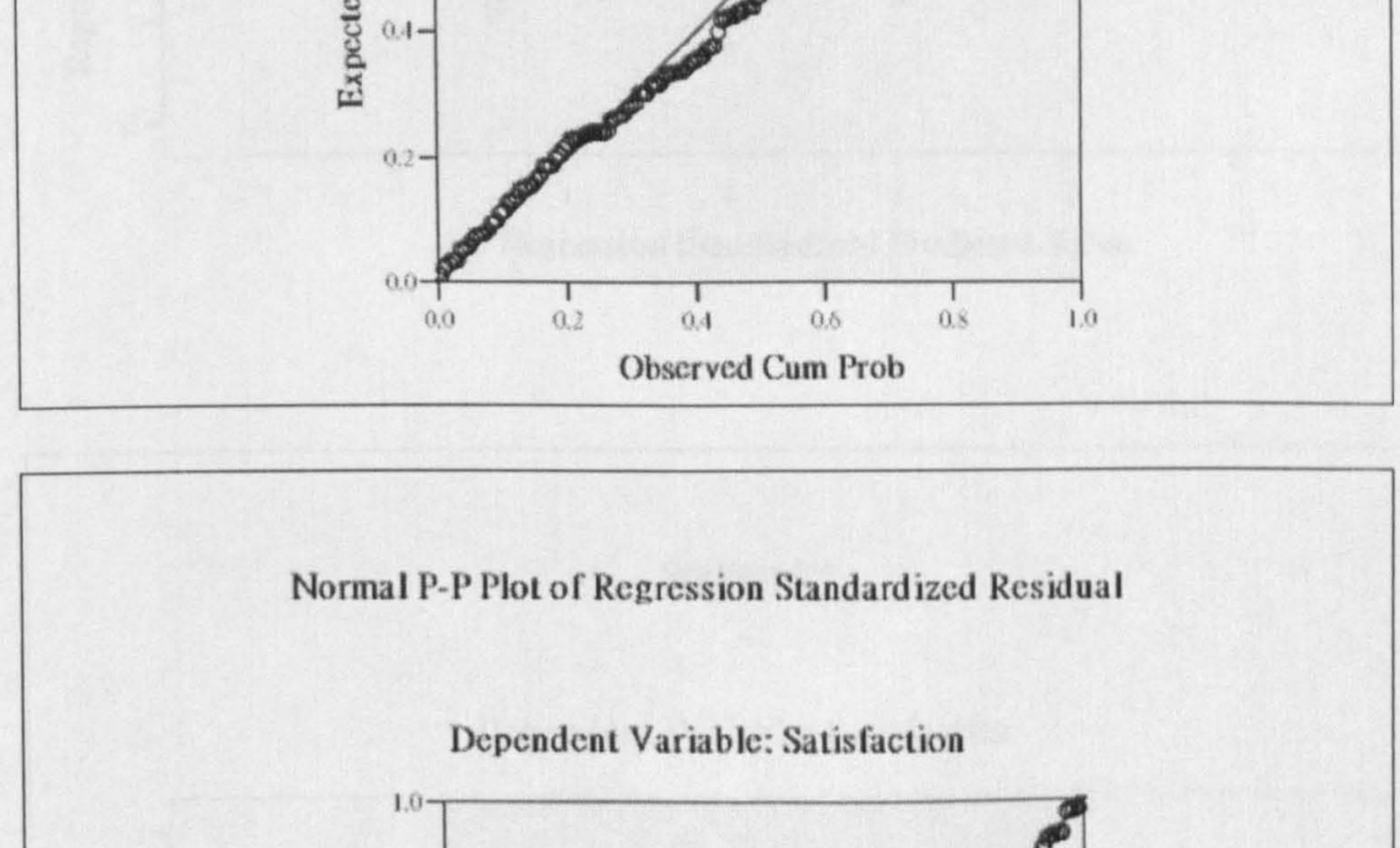
54. For some unknown reasons, a tutor answers most questions while a tutor seldom participates in OLE.

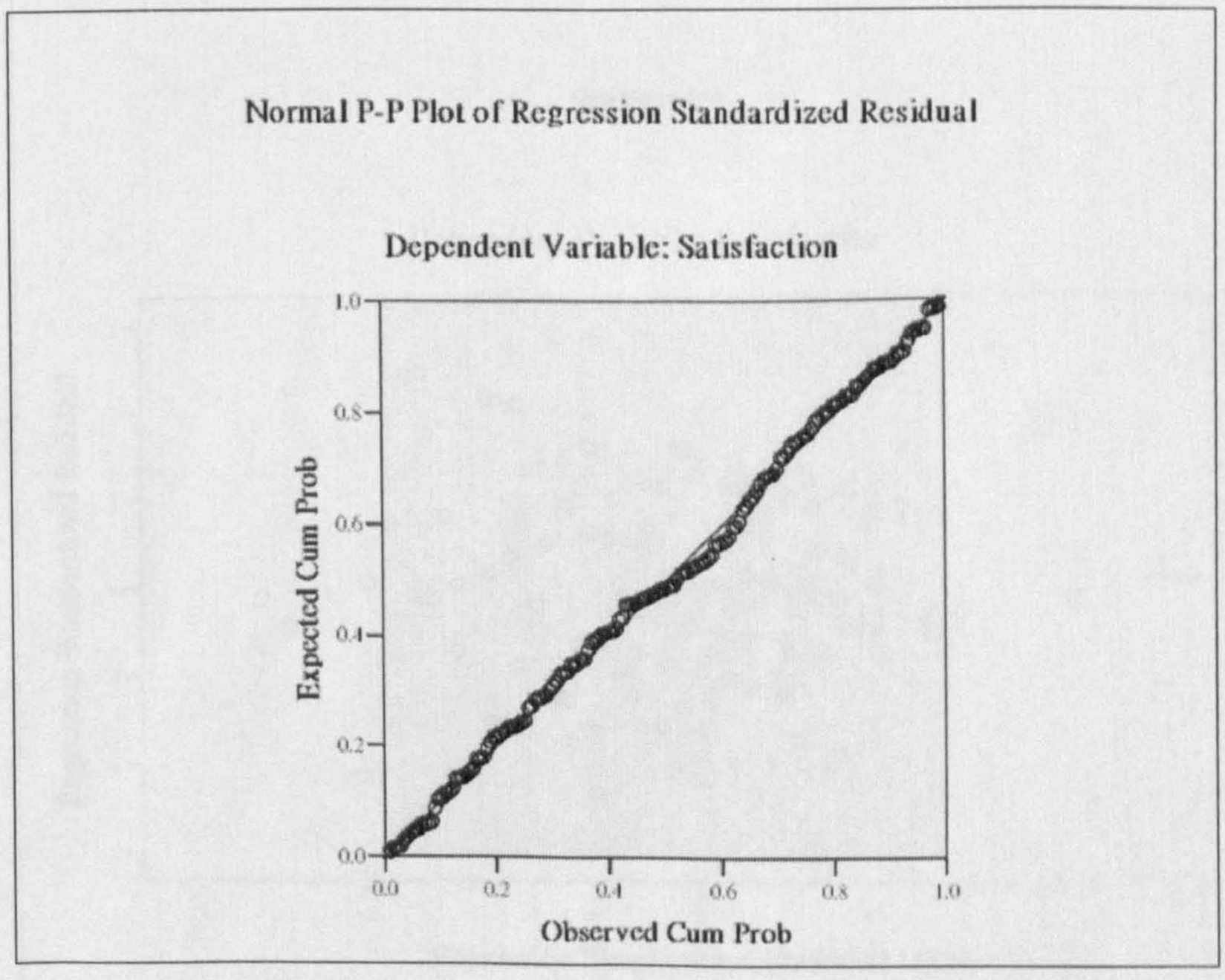
55. Overall, the discussion board we use in OUHK is very helpful tool.

56. *It would be better to have real-time chatting, just like the chat-room in yahoo or hotmail.*
若可好像 yahoo , hotmail 的 chatroom, 可以即時交談討論會更好。

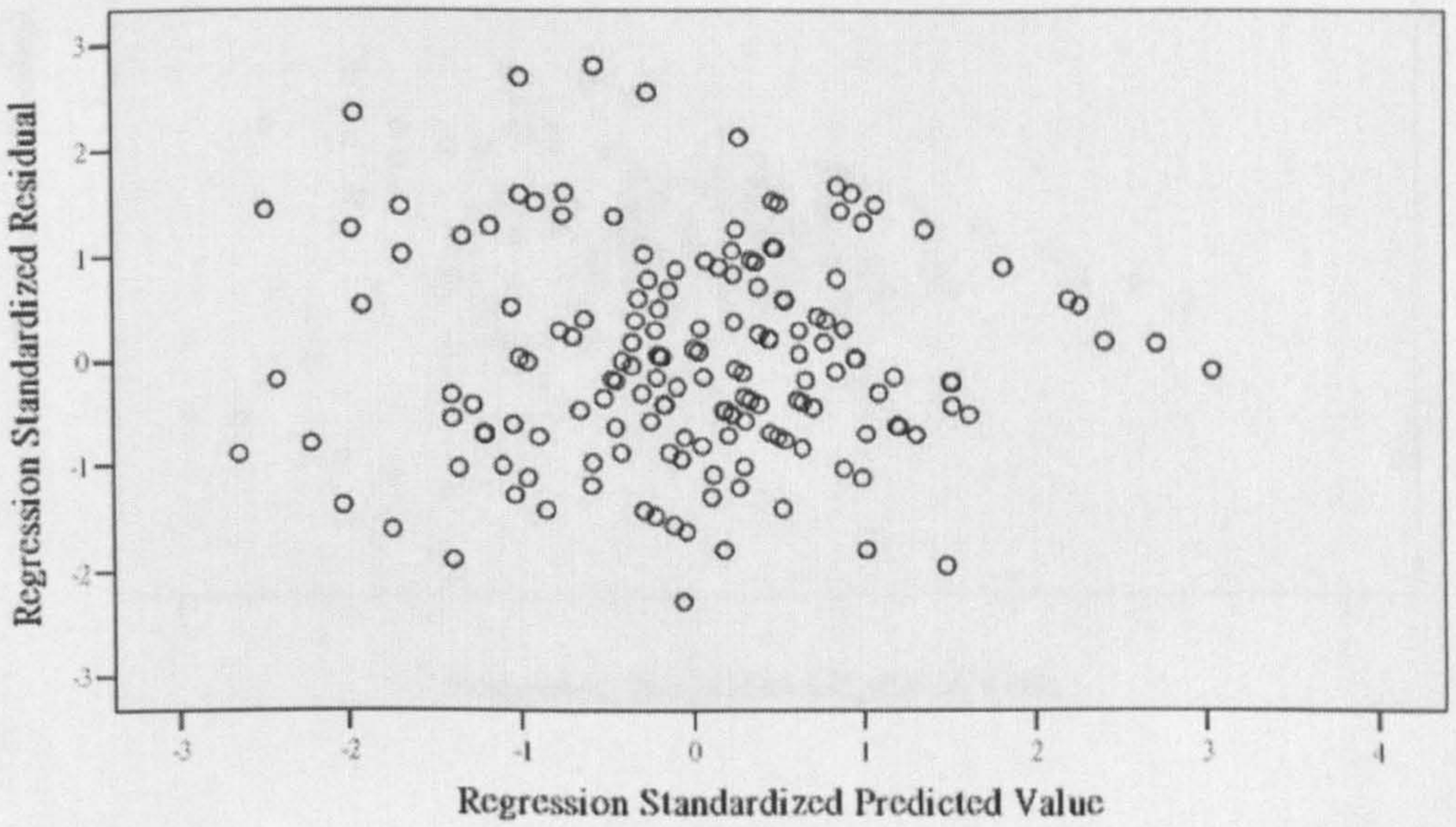
Appendix 7: Normal probability plots and residual scatterplots

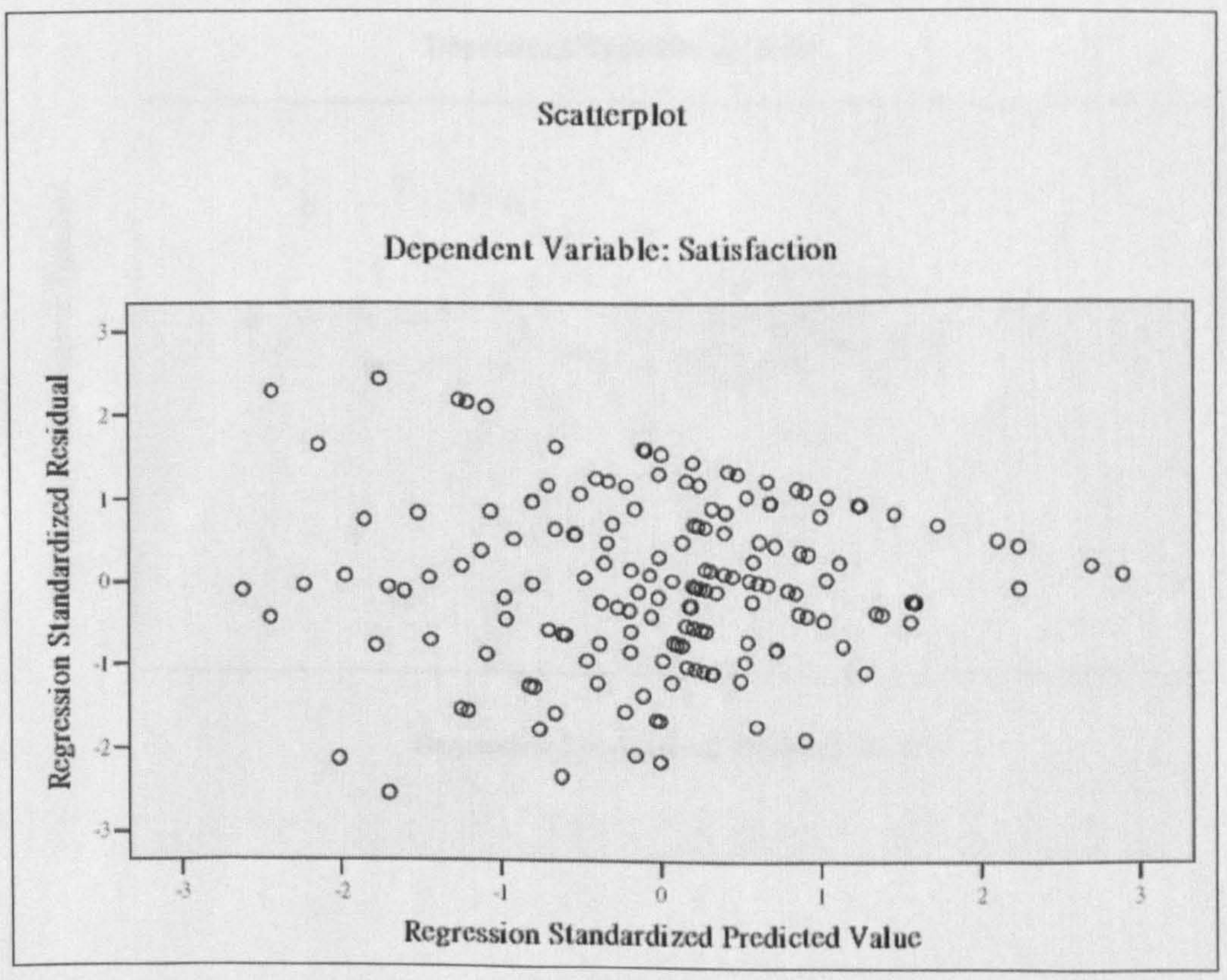
a. Normal probability plots





b. Residual scatterplots





c. Residual scatterplots after transformation of criterion variable